

The Mining Journal

London, April 21, 1961

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Making it Easier for Miners to Buy British

FOR some years past British exporters have seen valuable contracts snatched from under their noses by competitors able to offer longer-term credit. Now after a radical improvement in the facilities offered by the Export Credits Guarantee Department they can at last meet foreign credit competition on level terms.

The most important innovation in the credit insurance facilities offered by the department is a service of "export finance credits" which will guarantee loans made for periods longer than five years by banks and other financial institutions to overseas buyers who will use the proceeds to make payments to British exporters. These new long-term guaranteed loans are designed to finance exports of large-scale capital projects such as power stations, steel works, industrial plant, transportation systems, costing more than £2,000,000. Exceptionally, ocean-going ships will be eligible for assistance at a lower limit.

This is all very well as far as it goes but what happens in the case of marginal projects falling just short of the limit, or exports of, say, mining machinery and equipment which might well qualify in the aggregate but not in single contracts? The question immediately springs to mind whether this will inevitably free mining companies to form export consortia so as to be eligible for assistance. Since the new loans are clearly designed for under-developed countries where mining and mineral exploitation ranks high, surely it should be open to these countries to present a "shopping list" that could embrace mining plant and equipment which is as essential to the overall economic development of these customers as power stations and steel works.

Secondly, because the E.C.G.D. has operated at a substantial profit in recent years while the government's policy is for it to aim at breaking even, premium rates charged for E.C.G.D. insurance cover are being sharply reduced. There is a new scale of medium-term premiums which will reduce the total premiums charged by about 25 per cent. The total reductions in premiums will amount to about one-fifth of the department's average income from commercial business and cost over £1,000,000 a year. Certain "poor" markets, where cover under the old provisions cost up to seven times as much as "good" markets, have been upgraded and the charges there reduced up to 40 per cent.

Finally, a new and simplified service is to be provided as from May 1 next for small exporters whose export turnover has been running at less than £10,000 per annum in recent years.

Precisely how much overseas business British exporters have lost through not being able to match their competitor's credit terms cannot be measured, but there have been sufficient complaints that major orders have been lost on this score to convince the government, along with other evidence, that a radical change in British methods of financing and insuring exports was called for.

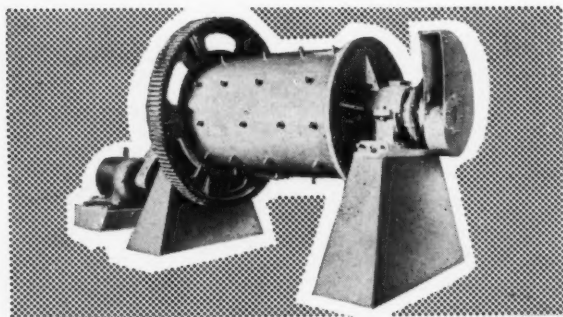


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It remains to be seen how Britain's competitors react to the claim that the introduction of export finance guarantees for more than five years does not constitute any breach of the Berne Union agreement. The fact is that the new long-term guarantees are seen not as an extension of suppliers' credits, which is all that concerns the Union, but rather a replacement of the old international bond market. The exporter will receive the bulk of his payment from the overseas buyer out of a loan made for that purpose by a British financial institution or group and this will be fully guaranteed by E.C.G.D. against the borrower's failure to repay any instalment when it is due. This is a self-liquidating investment and should be distinguished from supplier credit.

The E.C.G.D.'s credit guarantees will be granted direct to the financing institutions, the banks, insurance companies, pension funds and possibly investment trusts on loans which they make direct to the overseas buyer. For one reason or another many countries which used to raise loans on the London market cannot now do so. Private financial institutions are not always willing to stand the risk involved in some countries wanting to purchase large scale capital equipment. Furthermore, longer-term finance of more than five years, because it was uninsurable, has not generally been obtainable in the City for loans to buyers of British exports. Now under the export finance guarantee service an entirely different situation arises. A capital project that qualifies for the E.C.G.D.'s guarantee can now be financed in the City even if a 10 or 12 year credit is required. Instalments of the loan that mature during the first five years will be provided by the banks as hitherto, and refinanced at the Bank of England in part, while the longer-dated instalments will be found by non-banking financial institutions.

The government clearly prefers to act as a guarantor of loans made by private financial institutions rather than to make finance available itself direct to overseas buyers, probably because of a reluctance to negotiate a tied loan. The Americans and the Germans, for example, are far from being sensitive about tied loans, and though it might be politically embarrassing for the British Government to insist on this point, open loans are a luxury that Britain in isolation can no longer afford in present circumstances. However, in the last resort if private finance is not forthcoming for the new service it might make such direct loans under Section 3 of the Export Guarantee Act which would, of course, be tied in the same way as private finance to the export of British goods.

By reducing premiums and widening the range of acceptable risks the E.C.G.D. will need to be particularly selective in new business undertaken. The term of the export finance guarantee will depend on the expected life of the assets being supplied which must be for a substantial period beyond the period of the loan. Secondly, the department must be satisfied as to the creditworthiness of the buyer in the weaker markets and "exceptional treatment would have to be justified on the basis of good long-term prospects leading to a lasting and profitable connection for British trade". Finally, the extent to which the new facilities can be granted will be limited by the U.K. balance of payments position and the supply situation of plant and equipment in Britain.

There was a swift response to the government's new scheme in the City. On the day after the announcement, Lazard Brothers, the merchant bank, announced the formation of a consortium of 28 insurance companies to provide a total of £11,500,000 long-term finance which will be used for new capital projects that qualify for the E.C.G.D.'s new finance guarantees.

Evidently the government's announcement last autumn that the E.C.G.D. would be authorized to insure suppliers' credits for more than five years where this was necessary was a big enough straw in the wind for the bank to proceed with a plan to organize insurance finance in readiness for the anticipated revision of the E.C.G.D.'s services. Allowing for short-term bank finance the total volume of British exports that could be covered by the consortium's fund would be around £30,000,000. Lazards, it will be recalled, organized a group of banks to provide finance for the Durgapur steelworks in India.

Doubtless other banks will soon follow Lazard's example unless untoward delays arise through protracted negotiations to ascertain whether any particular project qualifies for the E.C.G.D. cover, or not. However, if as it is believed, the banks are lending money to Lazards at one per cent over Bank rate and the insurance companies are lending at 7 per cent, this is quite an attractive rate.

While there still remains a certain danger that fiercer competition between the older industrial exporting countries may eventually force them to call a halt and get together to impose credit limits, there is a big difference between intensifying a credit race and meeting reasonable demands for longer credit terms, which is what the E.C.G.D. has done. The mean lies between the capacity of the supplying country to provide finance and the goods themselves and the ability of the purchasing country to pay for its imports. Over-extension either way could have disastrous consequences. There is also the danger that credits extended beyond prudent limits could easily lead developing countries to burden themselves with more debt servicing than their economies can stand.

The fresh source of finance from the City attracted by the new export finance guarantees will provide a valuable addition to financial aid for under-developed countries but will this be enough? The next step is to encourage the flow of risk capital from private investors, which in turn stimulates demand for British exports. This can be done by removing the main fear of nationalization or penal tax laws. How international agreement on safeguards for private investors could be sought already exists in the draft charter for overseas investment drawn up by eminent British lawyers some time ago. There is no reason why the initiative should not be taken by the government to set up similar safeguards for British private investors, through some organization set up for the purpose.

Technical aid cannot be divorced from financial aid and if the visible exports can be underwritten, why not the services of mining and other consultants who, after all, not infrequently can have a large say in the purchase of plant and equipment by the countries that employ them?

SCIENTISTS TO PROBE EARTH'S DEPTHS

Following the news of the U.S. ocean bed drilling programme designed to core down to the Mohorovic Discontinuity (*The Mining Journal*, March 10), a programme for a concerted scientific investigation of the lower layers of the earth's crust and the mantle lying beneath the crust has been devised by the National Geophysical Committee of the U.S.S.R. Many scientific institutes and hundreds of scientists will take part in it. The research will extend only to the upper part of the mantle at a depth of between 700 and 800 km., whereas the entire mantle stretches 2,800 km. between the earth's core and crust.

Penetration into the depths of the Earth's crust and the upper mantle is of no less interest to science than the exploration of space, says the chairman of the committee, Professor Vladimir Belousov. With its help great progress

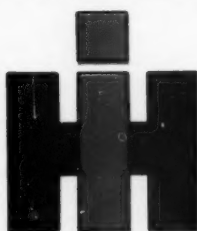


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can be made in solving such major problems as the origin of continents and oceans, the causes of the movement of the earth's core and the development of mountain ranges, magnetism and volcanic activity, the formation of metallic ore deposits and the origin and forecasting of earthquakes.

Professor Belousov explains that the new Soviet programme envisages more vigorous co-ordination and consolidation of research on the upper mantle and its influence on the development of the earth's crust. It forms part of an international programme of such research approved by the International Geodesical and Geophysical Union. Professor Belousov is president of this organization.

Essentially the programme will be based on a comparative study of the depths of the earth beneath various tectonic zones, continents and oceans. The principal continental tectonic zones to be studied are the ancient shields of Karelia and the Kola Peninsula, platforms of the type of the Russian Plain, folded mountains of various ages, the areas of transition from continents to oceans, island arcs, such as the Aleutians, and finally oceanic trenches.

Much is expected from thermometric studies to determine the flow of heat from the earth. In different regions this flow varies and data on its distribution will give some indication of processes occurring in the depths of the earth.

Deep seismic sounding will be applied on a wide scale. This technique has already yielded some interesting results in the zone of transition from the Asian continent to the Pacific Ocean. The upper mantle has been explored there to a depth of 100 kilometres.

As a result, it has been possible to establish intermediate types of structure of the earth's crust, which under the Sea of Okhotsk proved to be much thinner than on the continent, and thicker than under the ocean.

Geological studies have warranted the conclusion that the marginal (Okhotsk and Japanese) seas are comparatively young. The expansion of the Pacific ocean at the expense of the Asian continent has also been established.

Gravimetric, magnetometric and other studies are assigned a major place in the exploration of the lower layers of the earth's crust and the upper mantle, along with laboratory studies of the properties of rocks in conditions of high temperatures and pressures. All these studies, combined with data obtained earlier, offer great promise in the successful solution of many obscure problems of the science of the earth.

THE SEVENTH COMMONWEALTH CONGRESS

The Seventh Commonwealth Mining and Metallurgical Congress opened in Johannesburg on April 10. It was last held there thirty-one years ago.

Mr. C. S. McLean, President of the Congress and a former President of the Transvaal and Orange Free State Chamber of Mines, described in his opening address the spectacular growth of the mining industry in South Africa. Emphasizing in particular the growth of gold mining and pointing his remarks to the last thirty years rather than to those earlier events leading from the initial gold strike on the Oosthuizen farm at Langlaagte, Mr. McLean added that the known gold bearing reefs now stretched for nearly 300 miles from Kinross in the Eastern Transvaal to the Sand River in the Orange Free State.

The President said that in the last three decades annual milling rate of ore had risen by 126 per cent from 31,000,000 tons to 71,000,000 tons; gold output had doubled from 10,400,000 oz. to 20,900,000 oz.; the value of that output had increased by nearly 500 per cent from R. 88,000,000 to R. 524,000,000. The President suggested

that such expansion was spectacular anywhere; in terms of the South African economy it was phenomenal.

The Congress is convened in South Africa by The South African Institute of Mining and Metallurgy, in collaboration with the Northern Rhodesian branch and Southern Rhodesian associates of the Institution of Mining and Metallurgy, London. After four weeks in the Union, it moves to Northern Rhodesia for the week of May 7-14, where it will be under the aegis of the Northern Rhodesian branch of the Institute. The final week will be held from May 15-21 in Southern Rhodesia.

These past thirty years have been marked by phenomenal progress, as Sir Ronald Prain, Chairman of the Rhodesian Selection Trust Group of Companies said recently in London, one aspect of which is that the embryonic Rhodesian copper industry has grown into the "most concentrated copper mining industry in the world". Which indeed is in keeping with Mr. McLean's feeling that "Here in three neighbouring states . . . have been concentrated some of the world's largest payable deposits of gold, uranium, diamonds, copper, coal, platinum, iron ore, manganese, asbestos, antimony and corundum". He added that the exploitation of such mineral wealth was facilitated by the exchange of ideas that in turn was aided by the social contact established at such congresses as this.

The Seventh Commonwealth Congress of the Commonwealth Council of Mining and Metallurgical Institutions is being attended by 1,100 delegates. Some 400 of these come from beyond the borders of the Union, representing the U.K., the U.S., Canada, Australia, New Zealand, and the Central African Federation.

It will be recalled that a comprehensive list of the papers to be presented at the Congress was published in our issue of July 8, 1960.

NEW BRITISH NUCLEAR GROUP

Rolls-Royce, Imperial Chemical Industries and Rio Tinto have jointly formed a new company called Nuclear Developments, the first private venture in Britain which has been licensed to manufacture nuclear fuel elements for civil purposes. Nuclear Developments will co-operate with atomic power consortia in the civil nuclear engineering field.

This is a strong team. Rio Tinto mines and processes uranium on a large scale, Rolls-Royce has been engaged in nuclear engineering for about eight years with particular interests in fuel elements for marine propulsion, while I.C.I. Metals Division has developed the technique and know-how of nuclear metal and reactor component manufacture over the last 20 years. Beryllium, zirconium, niobium and vanadium are included among the metals in which I.C.I. has had a particular interest.

URANIUM REFINING BEGINS IN THE UNION

A pilot plant for uranium refining has been commissioned in South Africa at the government's metallurgical laboratories in Johannesburg. The plant, which cost R. 500,000 (£250,000), has a refining capacity of 100 tons of uranium a year and is the first to be built in the Union. It will be used basically as a research project for the investigation of methods of refining uranium metals and salts. Nuclear fuels produced will eventually be tested in the South African Atomic Energy Board's reactor that is expected to be commissioned at Pelindaba towards the end of 1963.

Canada's Mineral

The following notes are condensed from Mineral Information Bulletin MR 49, "A Preliminary Survey of the Canadian Mineral Industry in 1960", published by the Mineral Resources Division, Department of Mines and Technical Surveys, Ottawa

CANADIAN official opinion is that all in all, the year 1960 might be termed a good one in so far as the mineral industry is concerned. It was a year, however, in which areas of immediate difficulty for the industry were revealed and areas of future difficulty foretold. Yet the ultimate picture is one of the growing role that Canada will play in an increasingly mineral-conscious world.

Uranium: Uranium registered a 21 per cent drop in both quantity (12,517 tons) and value (\$262,935,404) compared with 1959, when it was second only to crude petroleum in value of production. During 1960, the industry passed through an intensive period of consolidation, through mine closures, transfer of government sales contracts and company amalgamations. At the end of 1960,

there were only 10 producing uranium mines compared with 23 during the high point of the industry in 1959. The year 1960 also saw an intensification of research directed towards lower production costs and the development of new industrial applications for uranium.

Aluminium: Canadian production of aluminium in 1960 is estimated at 745,000 s.tons, of which 558,000 s.tons were exported and 102,000 s.tons consumed domestically. Production and exports set new records.

Nickel: Nickel production in 1960 at 213,641 s.tons valued at \$313,000,000 established a new high and replaced uranium as the second most valuable (after crude petroleum) of the minerals produced in Canada. The development of the nickel deposits at Thompson, Manitoba, proceeded on schedule and first production of refined nickel is expected in 1961. The year witnessed the complete loss to the Free World of nickel production in Cuba; the Moa Bay nickel plant was closed down and the Nicaro nickel plant was taken over by the Cuban Government. However, Canada's nickel production capacity assures an ample and continuing supply for growing Free World needs.

Molybdenum: Molybdenite Corporation of Canada Ltd. was the sole producer of molybdenite and molybdic oxide in 1960. Total production and shipments of contained molybdenum totalled 758,507 lb. valued at \$1,000,265.

Copper: Although Canadian copper production in-

Transporting Canada's mineral products. A large bulk carrier passes Cardinal, Ontario, on the St. Lawrence Seaway



Industry

in 1960



The railway has a strong tradition of service to Canadian mining. Drilling for blast in a cut through along the right-of-way for the line opening up the Quebec Cartier Mining Co.'s development of the Lac Jeannine iron ore field

creased by 11 per cent in quantity in 1960 and was at a record level, there is a world surplus of copper and a consequent trend towards lower prices. Canada improved its already strong comparative position as the fourth largest contributor to the Western World's copper supply, following the United States, Chile and Northern Rhodesia in that order. Copper properties are being explored and developed for production in several areas of Canada despite the ten-per-cent-cutbacks in output instituted in October, 1960 by most of the major copper producers. Further voluntary reductions in Canada and other countries will possibly be necessary in 1961 before production and demand are in balance.

Cobalt: Cobalt production during the year under review was 3,330,914 lb. valued at \$5,669,560. There has been no production of cobalt ores in Canada since 1957. Production has been obtained as a by product from the silver ores of the Cobalt and Gowganda areas of Ontario and from the smelting and refining of nickel-copper ores in the Sudbury and Lynn Lake areas of Ontario and Manitoba respectively.

Gold: Gold production increased slightly to 4,600,000 troy oz. valued at \$156,000,000. During the year, there was considerable interest in new gold properties due principally to small price increases of short duration and to the hope that the large and continuing decrease in United States gold reserves would result in a substantial increase



The aeroplane has played an important role in developing Canada's mineral industry. Above is an Otter owned by Canadian Aero Mineral Surveys Ltd., a Toronto subsidiary of Canadian Aero Service Ltd.

in the United States purchase price for gold. However, the problems confronting the Canadian gold mining industry during the 1960's will be those of the 1950's, only intensified in their social character as the major gold mining camps become older and their ore reserves near exhaustion.

Silver: Silver production during 1960 was 32,328,143 oz. A major increase in production amounting to over 1,000,000 oz. was recorded in British Columbia. Smaller increases were reported from Manitoba, Quebec and the Northwest Territories. Production from the remaining silver producing regions of Ontario, Newfoundland, Saskatchewan and the Yukon declined.

Platinum Metals: Canadian production of the platinum metals at 460,321 oz. troy and valued at \$27,673,687 was 36 per cent greater than in 1959 and was the second highest on record. The value of platinum metals ranks ninth in Canada's metal output. The platinum metals include the two groups of platinum-iridium-osmium and palladium-rhodium-ruthenium. All occur in the nickel copper ores of the Sudbury district. Osmium is not recovered in commercial quantities.

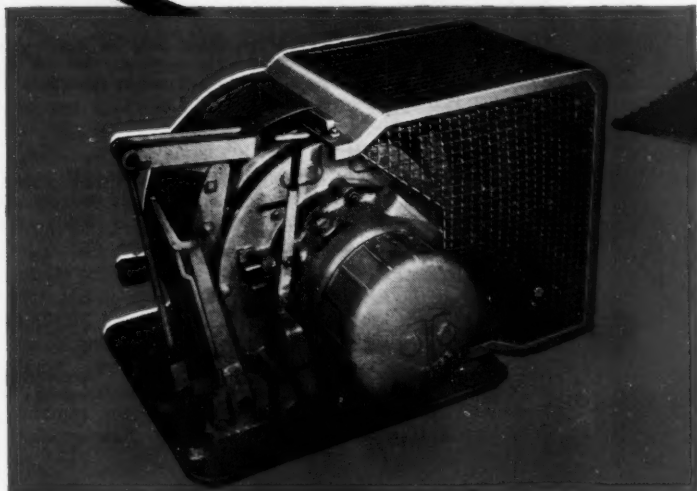
Magnesium: Production of magnesium in 1960 is estimated at 7,200 s.tons with consumption at 2,300 s.tons.

Lead and Zinc: Lead and zinc import quotas, imposed by the United States Government on September 22, 1958 remained in effect throughout 1960. The restrictions, accompanied by a general world oversupply of these metals, had a restraining effect on Canadian production levels. Mine production of zinc increased by 2.4 per cent over 1959 during the year under review, amounting to 405,620 tons. Canadian lead output in 1960 is estimated at 189,267 tons valued at \$40,427,281.

Asbestos: Asbestos shipments in 1960 increased 8.6 per cent in quantity and 10.5 per cent in value. Although Canada continues to supply a major part of the world's asbestos requirements, information now indicates that production in the U.S.S.R. is about equal to that of Canada. Nearly all U.S.S.R. production, however, is consumed within Soviet bloc countries and only small amounts, as yet, are causing disturbances in Western European and other world markets. In 1960 Canada produced 1,140,538 s.tons valued at \$118,700,998.

Potash: Because of the difficult underground water problems at the mine of Potash Co. of America, near Saskatoon, there was no production of potash in Canada during 1960. However should shaft sinking proceed on schedule at the property of International Minerals and

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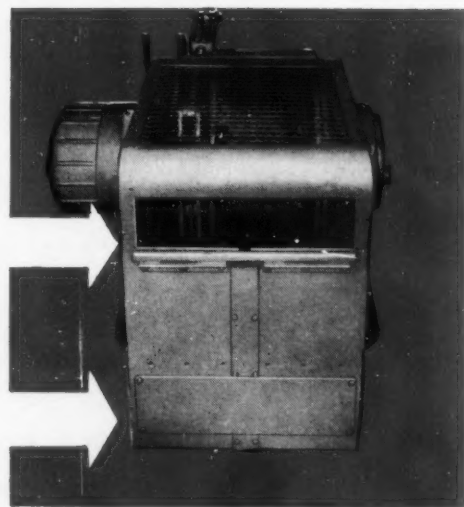
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An excellent illustration of the manner in which Canada has been opened up. A helicopter supplies a drilling and surveying party during the opening up of the Thompson area in Manitoba.

Chemical Corporation near Esterhazy, there may be production before the end of this year. (See *The Mining Journal*, March 17, 1961).

Titanium Dioxide: The value of the titanium dioxide produced at Sorel, Quebec from ore mined at Allard Lake, increased 67 per cent during 1960.

Iron Ore: Iron ore shipments declined in 1960 to 19,200,000 l.tons valued at \$172,000,000, a decrease of 12 per cent in quantity and 11 per cent in value from 1959. Decreased shipments to the United States in the latter half of the year resulted from a low steel operating rate of about 50 per cent of capacity. The long-term prospects for the Canadian iron ore industry remain promising, however, with an expected output of 45,000,000 l.tons in the mid 1960's, rising to between 55-70,000,000 l.tons in 1970.

Coal: Production for the calendar year 1960 was approximately 11,226,400 s.tons. This output is close to the lowest of the last half century.



Opencast Blasting at Kamativi, S. Rhodesia

IN Southern Rhodesia, Kamativi Mines Ltd. is mining flatly dipping pegmatites in underground, as well as opencast, operations. Ammonium nitrate-diesel fuel mixtures are used as blasting reagents, the introduction of which has meant a considerable saving in breaking costs as compared to the use of ordinary explosives. Results are proving to be as good as with the use of standard explosives, and it appears that under the circumstances prevailing in this opencast, a better fragmentation is obtained.

Operational Conditions

The widths of the pegmatites vary from a few inches to over 50 ft., whilst the dip varies from 0 deg.-40 deg., with 22 deg. being normal. The footwall and the hangingwall consists of metamorphic schists, showing a sub-vertical schistosity.

Outcrops of the very flatly dipping wide lodes are mined in opencast operations. These operations are at present concentrated in the so-called Souchon Area of the claims, in a pegmatite with an average dip of 11 deg. N.E., and a width of 10-50 ft. The footwall of this pegmatite is very irregular, which creates special difficulties as far as blasting and loading is concerned.

At present a 100 ft. wide roadcut is being blasted, oblique to the contour lines of the footwall, in order to obtain a floor on 6 deg. - 8 deg. grade. The actual exploitation will start later from the initial cut. Loading is done by R.D.38 power shovels into 10 ton tip trucks at a rate of 10,000 t.p.d.

Mineralogically, the Souchon pegmatite consists of coarse grained feldspar, less quartz and little muscovite.

The following article, by S. Dijkstra, section mine manager at Kamativi Tin Mines Ltd., is condensed from "Chamber of Mines Journal", Southern Rhodesia

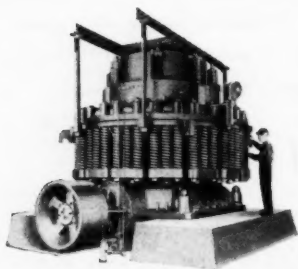
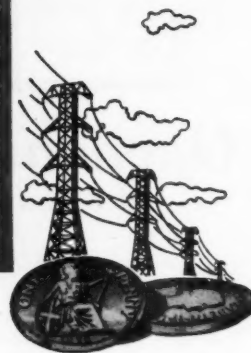
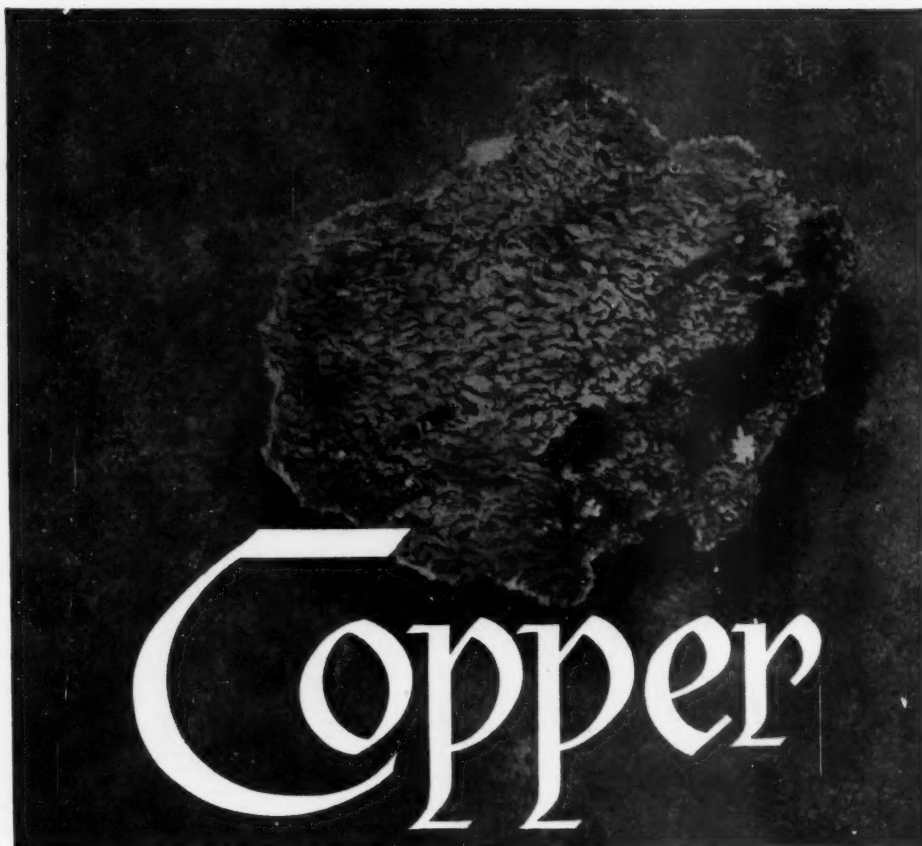
Kaolinization and albitization processes have caused the presence of irregularly shaped soft sections in the otherwise hard pegmatite. The jointing system is well pronounced, with two joint planes more or less vertical and a third one sub-horizontal. Joint planes, however, may be rather far apart and may then cause coarse fragmentation in blasting operations. Economic minerals in the Souchon lode are cassiterite, columbiatantalites, and Be- and Li-containing minerals, of which only the first two are of commercial importance at present. Concentration is done by gravity separation.

Drilling Pattern

A wagon drill is used for drilling vertical blastholes of 2½ in., 3½ in., 4 in., and 4½ in. dia. Dry drilling is applied, and the dust is controlled by a device, based on the principle of a venturi-effect, combined with a waterspray.

The drilling pattern depends upon the character of the rock in the section to be blasted. As the conditions are never the same, no standard pattern can be adopted.

For each blast the following points are considered :



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While native copper is the only metal found abundantly in nature, commercial production is supplied chiefly from various ores of copper, including chalcopyrite, chalcocite, cuprite and malachite.

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1. Whether or not a section of the footwall has to be broken.

As the floor of the roadcut should be of even grade, it may become necessary to blast sections of the footwall, simultaneously with the pegmatite lode above. The metamorphic schists of the footwall require a considerable higher powder factor (lbs. explosive mixture required to break one ton of rock) than the pegmatite, and a closer drilling pattern is accordingly required.

The Powder Factor

This difference in powder factor is even aggravated by the presence of the sub-horizontal joint-planes in the pegmatite. Due to these jointplanes the shearing strength near the bottom of a vertical hole in pegmatite is thought to be less than in metamorphic schists, where no well developed joint system exists. For the same reason it is thought that the sub-horizontal joints decrease the apparent tensile resistance of the pegmatite.

In blasting schists with ammonium nitrate-dieselene mixture we have adopted a powder factor of 0.70 whilst holes are drilled deeper than required, to ensure proper breakage to the roadcut elevation. Experience has proved it difficult to obtain proper breakage to the bottom of blast-holes drilled in schists, and therefore extra footage is drilled, instead of taking the risk of being left with a toe, that may hamper loading operations later. If only a few feet of footwall have to be broken, the bottom section of the hole is filled with explosives of higher detonating velocity, for instance with $3\frac{1}{2}$ in. x 22 in. cartridges of ammonium gelignite or fre-flo dynamite.

2. The hardness of the pegmatite.

For breaking and proper fragmentation of hard unaltered pegmatite, a powder factor of 0.35-0.40 is required, when blasting a single line of blast holes to a free face. Kaolinized and albitized pegmatite requires a factor of only 0.18-0.20.

If more than one line of holes has to be blasted, which is normally the case, the powder factors are slightly increased for the next lines (by 0.02 to 0.04). As a rule burden and spacing are kept equal, for $3\frac{1}{2}$ in. dia. vertical blastholes of 30 ft. depth, a common burden is 10 ft. by a spacing of 10 ft. For $4\frac{1}{2}$ in. dia. blastholes these figures are respectively 13 ft. by 12 ft. Obviously burden and spacing depend on the accepted powder factor and may, therefore, vary considerably.

3. The amount of back breaking of previous blasts.

Soft sections in the pegmatite may cause heavy back-breaking in places, rendering drilling near the free face for the next blast impossible. To overcome this difficulty, the first line of holes is often given a heavy burden with close spacing, for instance 20 ft. x $5\frac{1}{2}$ ft. for $3\frac{1}{2}$ in. dia. blast-holes. In the case of severe backbreaking in soft top sections, the first line of holes may even be drilled at 75 deg. instead of vertical.

4. The expected backbreaking.

If heavy backbreaking is expected, the last line of holes may be drilled with $2\frac{1}{2}$ in. bits, applying a relatively heavy burden (say 7 ft.) and close spacing (say 3 ft.); only the bottom sections of such holes are meant to be charged, for which standard 2 in. by 22 in. cartridges 60 per cent gelignite and dynamite are used. Small diameter holes are not charged with ammonium nitrate-dieselene mixture, as incomplete propagation of detonation would result.

When heavy backbreaking is not anticipated, the last line of holes is drilled with $3\frac{1}{2}$ in. bits at a closer pattern than normal, and charged as lightly as practicable with ammonium nitrate-dieselene mixture.

Charging Procedure

Holes of $3\frac{1}{2}$ in., 4 in., and $4\frac{1}{2}$ in. dia. are charged with a mixture of prilled ammonium nitrate (commercial grade) and dieselene, using one gallon of dieselene per 100 lbs. ammonium nitrate instead of 6-7 pints as generally advised and as needed for the oxygen balance of the chemical reactions that take place. It is preferable to use dieselene in excess, as the mixing method operative is not ideal, and the blasting efficiency is decreased less by surplus than by a shortage of combustible.

Although ammonium nitrate fuel mixtures are not as easily detonated as standard explosives, the same safety precautions are adhered to. Originally the mixture was prepared by pouring one gallon of dieselene into each 100 bags of ammonium nitrate. The dieselene was allowed to settle for one hour and then the holes were charged by pouring the mixture from the bags direct into the holes. Results were not satisfactory as no proper mixture was obtained whilst large lumps of ammonium nitrate caused difficulties in charging up.

In a later test, mixing by pouring screened ammonium nitrate and dieselene simultaneously into the blastholes was tried, regulating the flow of dieselene manually. In general, results were not unsatisfactory, but frequently it was observed that proper mixing was not obtained in certain sections of the holes, resulting in incomplete detonation.

At present mixing of screened ammonium nitrate and dieselene is carried out in wine barrels by stirring the mixture with wooden pick handles. The prepared mixture is transferred into measuring boxes and poured into the blastholes through copper funnels.

Usually 40-60 per cent of the hole is filled with explosive mixture, and the remainder of the hole is filled with sand or drill cuttings. Under special circumstances, for instance if a hard top layer is present, holes may be filled for more than 60 per cent, the extra charge being intended to give a better fragmentation.

It has been found that a good loading intensity can be obtained without tamping. As far as can be observed microscopically, no air spaces are present between the charge and the walls of the holes or between the individual prills in the mixture. It is important that the prills of ammonium nitrate are of different sizes.

Detonation is caused by means of a single line of Cordtex down in the hole with one $3\frac{1}{2}$ in. x 22 in. cartridge of 60 per cent ammonium gelignite attached to it at the bottom, and 1 in. x 8 in. cartridges of 60 per cent ammonium gelignite threaded on to it at 16 in. intervals. This Cordtex line is lowered prior to charging. The reason for the close spacing of the 1 in. x 8 in. cartridges is to increase the apparent speed of detonation of the mixture by having multiple initiation.

The Cordtex lines of the different holes are connected to corresponding double Cordtex trunklines, which are ignited electrically by milli-second detonators.

Blastholes containing water from seepage are first blown out with compressed air. So far, no special difficulties have been encountered in using ammonium nitrate - dieselene mixture in damp holes. However holes having a steady in flow of water are charged with standard cartridges of ammonium gelignite, as it is known that ammonium nitrate-dieselene mixtures are not suitable for very wet conditions.



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COMPRESSED air is power. Ice-free channels through Stockholm's waterways have been kept clear by air pumped from Atlas Copco compressors through perforated underwater pipes. In Canada and in U.S.A, in Greenland and in Sweden, an increasing number of dock and harbour authorities are finding the Atlas Copco Air Bubbler System essential for easing the costly, paralysing grip of ice in northern harbours.

Wherever you go you will find Atlas Copco equipment at work; portable compressors for a new Middle East pipeline, sprayguns at Jaguar's Coventry works,

loaders in the German coalmines or rock drills for Ghana's new Tema harbour project. The company's air tools are used to build Sud-Aviation's Caravelle. Philips, Vauxhall and I.C.I. have chosen Atlas Copco compressors for applications where continuous air supplies are vital.

With companies or agents in more than 100 countries, Atlas Copco is the world's largest organisation specializing in this field. Wherever you are, the international Atlas Copco Group will advise you on the applications of compressed air and provide a complete after-sales service.

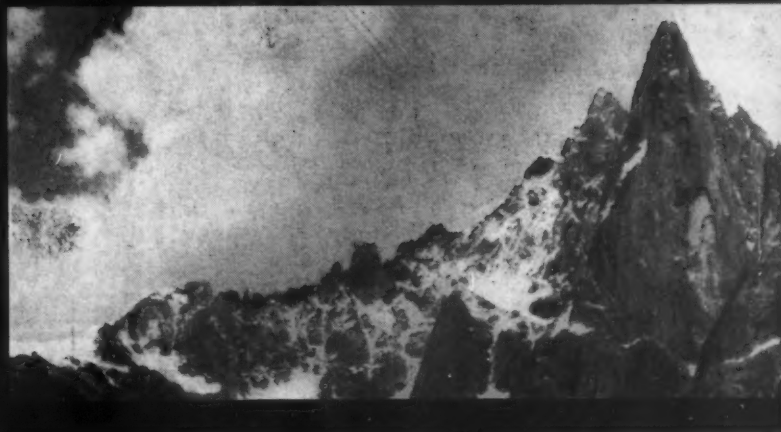
MORE POWER FOR FRANCE

To Electricité de France the Savoy Alps mean power. The Roselend Valley project, for example, involves building two dams and a 476,000kW power station—the most powerful in the country—which will increase France's power reserves by 1,000 million kW a year. Atlas Copco equipment has been used almost everywhere at Roselend—the main tunnels being drilled with more than 100 Atlas Copco rock drills and many thousands of Sandvik Coromant steels.



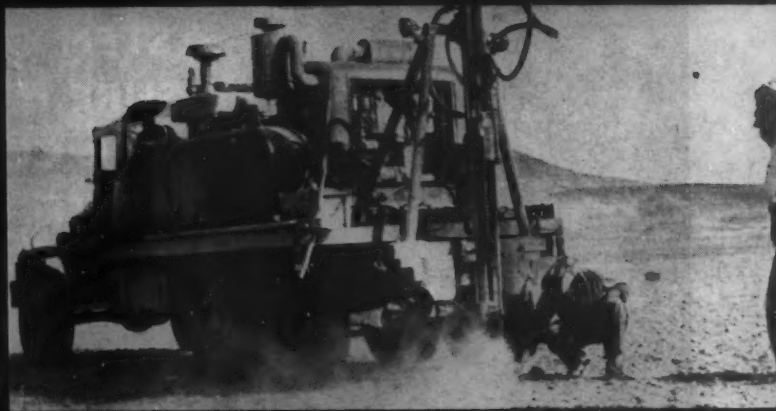
THROUGH THE HEART OF MONT BLANC

On completion of the seven-mile Mont Blanc road tunnel motorists will find Paris 137 miles nearer Turin. For the first time they will be provided with an Alpine link between France and Italy open all the year round. More than half the tunnel is being driven from the Italian side using Atlas Copco rock drills fitted with Sandvik Coromant drill steels and powered by Atlas Copco compressors.



OIL PROSPECTING IN THE SAHARA

In the continuing search for hidden oil resources in the Sahara, seismic prospecting techniques are often employed. Many prospecting companies use Atlas Copco equipment to drill the hundred or more sounding holes for each blasting pattern. Typical of the units used for this work is the Atlas Copco truck-mounted compressor—air cooled for desert operations—driving a chain-fed rock drill with Sandvik Coromant drill steels.



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Large-Scale Lead Smelting

By

C. C. Downie

THE smelting of lead materials ranging from galena, poorer ores, purchased drosses, and battery plates, to odd lead-bearing residues, which is carried out on a prodigious scale in the U.S.A., has seen a number of changes in plant and procedures adopted. As with the smelting of nickel ores, the tendency appears to be to revert somewhat to large oil-fired reverberatory hearths, although the blast furnace is also persevered with. The ease of handling oil, freedom from ashes accumulated in the slag, and reduced fume accumulations have all contributed to this reversion, since otherwise the blast furnace has been generally accepted as the most economical means of smelting.

Some earlier figures indicate that whereas it is possible to attain 30 to even 50 per cent thermal efficiency with blast furnaces, the reverberatory hearth may range from as low as from 10 to 15 per cent efficiency. Such a comparison largely depends upon the length of duration of the smelting, but howsoever approximate, the blast furnace has always been regarded as less costly to operate than the reverberatory, and oil-firing appears to have made its inroad mainly in view of other advantages gained. With rich lead charges, where the lead content may be upwards of 80 per cent lead, the tapped lead, instead of being handled by the Arentz siphon tap, is first run into a heated pan and thence directly siphoned into a second capacious kettle.

This largely offsets the need for skimming or separate removal of what matte or dross may have accumulated on the surface.

Particularly where the charge is predominantly metallic, the large oil-fired reverberatory hearth is very largely utilized, although to some extent it has been more recently replaced by magnesia-lined rotary hearths. Unlike some other designs, the cylindrically-shaped hearth is mounted on rollers, while trunnions at either end are linked up to an electric motor through gears. Both a slag hole and tapping hole may be retained at fixed levels by an appropriately designed plate, and in view of the constantly rotating disposition, the magnesia lining is consistently corroded away, whereby there is no evidence of a slag-line cutting its way through the refractories as with stationary reverberatories. Charging is done with the assistance of a magnetic vibrator, from an inlet of the trunnion at one end, while the oil burner is located in the trunnion at the other end.

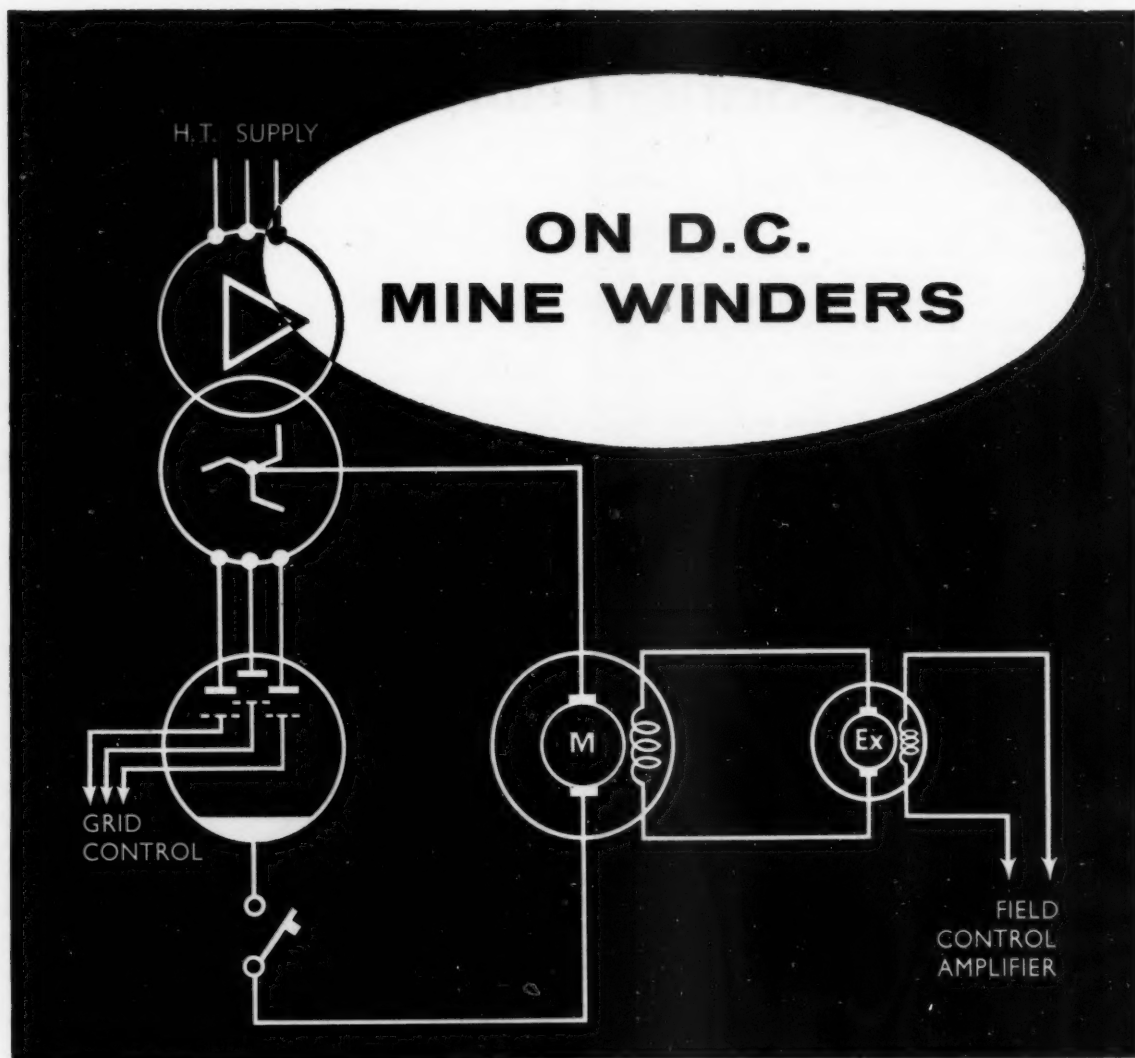
Where the conditions are under close control, the process thus functions as a continuous one, charging, slag-removal, and lead-tapping proceeding in non-stop sequence. This "chain-belt" system makes a great appeal to the American general outlook on smelting (and in some respects, the blast furnace would appear to be now taking a secondary role). It gives satisfaction where the charges are more or less consistent, and the general character of the process does not necessitate much re-arrangement, thus facilitating the continuous rotary system. Added to this are associated processes, such as those (already described) of continuously handling scrapped car batteries, which are dealt with on an enormous scale. Briefly, the old batteries pass along a conveyor belt and enter a trough of water, where a hammer descends and breaks-off the lining, and allows the sulphate sludge, including lead peroxide, to descend to the bottom, while the crushed lead block is removed to a further conveyor belt, and proceeds directly to the rotary furnace.

This "chain-belt" system of working is not of the same value where the collected lead sludge has to be handled. This, together with other accumulations of the same purchased material, as well as lead fume and anthracite, are reduced to metal. Where the carbonaceous matter in such charges is around 15 per cent, no anthracite is necessary, while where this successively diminishes down to 2.5 per cent carbon, additions of it range from $\frac{1}{4}$ cwt. to $1\frac{1}{2}$ cwt. per ton of charge. Another range of formulas is used where galena is mixed with the sulphates, but in either case, there is relatively little option but to resort here to using normal stationary reverberatories. The composition of the charges varies too markedly to permit using the continuous rotary process, although on occasion it has been tried out at slow-speed.

Dross Skimming Arrangements

The melting kettles which handle the crude lead are some 14 ft. in dia., with a capacity of upwards of 200 tons, arranged in a battery, but operated on a slightly different system from what is used elsewhere. Oil-firing is again utilized for these semi-spherical kettles, and the process in some ways is an adaptation of the original Pattinson system, rendered economical by the large-scale arrangement of working. The lead is not allowed to lie quiescent, as is done in other quarters. Normally what little tin is present oxidizes before lead, mainly because it has a lower specific gravity, and tends to float to the top, and is followed by antimony and arsenic. The large crystallizing hearth, which represents the basis of the earlier system of slowly separating the constituents, prior to the introduction of the aluminium method of removing antimony and which is still persevered with on the Continent, has apparently not enjoyed much popularity in the U.S.A. Strange as it may appear, while the "chain-belt" system of working has materially speeded-up reclamation, some of the fundamental and rudimentary reactions have been relegated to a secondary role, and in a number of cases do not appear to be fully appreciated. The normally formed antimonial-copper crusts are not given the usual opportunity to float upwards, as a paddle keeps the molten lead in continuous motion, and only a brief period is allowed for settling and skimming.

The result of this is ultimately shown in that some copper remains to the later stages of the process, when it necessitates sulphur additions to remove it — a thing unknown to the slower small-scale of working, but which suits mass-production methods. In some of the kettles, the removal of drosses is facilitated by a stream of water playing on the surface while the lead is revolving, in order to keep down the temperature. Thus with a view to assisting concentration, one set of drosses is skimmed off, and passed to the next kettle, largely on the principle that oxide of lead will oxidize antimony. Tables of figures are made out



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to show how this concentration proceeds from stage to stage. Any zinc which has happened to find its way into the lead remains intact in the lead oxides, but otherwise with drosses containing antimony, arsenic, and a little tin, it is the lead which is most readily reduced, and contact with the fresh metallic bath acts on the drosses as a form of reduction. Flat rabbles supported by chains from an overhead gantry are used to skim and return the drosses from one kettle to the other. The molten lead is transferred from kettle to kettle by powerful centrifugal pumps, with 4 in. dia. discharge pipes, operated by direct-current motors, while the mixing is done with what appears to be small ship's propellers, again operated by electric motors. In order to render all mixers and pumps portable they are assembled, together with their motors, on a framework which extends the length of the kettle-house.

One of the patented devices acquired, but which did not appear to enjoy much use at this stage, was the Harris skimmer, which comprised an equipment functioning much in the manner of a large nut-cracker. (This device appears to have been more widely utilized in small refineries, particularly where much sweating of lead drosses is undertaken.) After the drosses have been drawn more or less to one side of the kettle, the lower perforated jaw of the skimmer passes beneath the surface, and on up-raising, the upper jaw is caused to press down upon the dross contents, squeezing out any surplus lead, and provides a cake, in place of the familiar loose drosses which normally retain much metallic lead. The cake of drosses is really better suited where it has to be directly returned for re-smelting, and the loose form of dross, as otherwise skimmed off, is preferred probably for reasons of better oxidation. (It should be added here that although pulverized coal, even containing 12 per cent moisture, gives corresponding thermal efficiency, and more economical firing than does oil-firing, the latter is preferred for the reasons stated.)

Ultimate Softening and De-silverizing

Where the original material is rich in antimony, the ultimately concentrated drosses are dispatched for smelting in small blast furnaces to rich antimonial blast pigs. The final sulphurizing to remove copper is claimed to reduce this constituent to under 0.1 per cent, although it is probably more than this, while antimony contents of the lead range from 0.3 to 0.4 per cent. In view of so much secondary lead being added to the process, as distinct from where ores alone are handled, it is understandable that relatively little arsenic exists, and the lead-softening usually maintains this under 0.05 per cent. Discrimination is made between the drosses as taken off at different stages and which are analysed for these constituents.

Another patented process which was purchased, but given only occasional use, was that of adding a select calcium-magnesium alloy to remove bismuth, but evidently there was insufficient bismuth present to justify its use, while the treatment was somewhat slow.

De-silverizing of the softened lead is then proceeded with on an elaborate scale, also using kettles of some 200 tons capacity, but all of this work is completed within the 24 hour day. Unlike the somewhat promiscuous additions of zinc used for this purpose on the small scale, each addition, following an assay, is added to an exact weight, with the temperature maintained within strict limits, usually somewhere around 430 deg. C. and then diminished at the different stages.

As distinct from making extensive additions of zinc as are done in certain smaller refineries, where the zinc is distilled off for further use, four or five additions are made, following tables which are prepared for this purpose. (It is theoretically possible for 1.5 per cent of added zinc to remove 0.1 per cent silver.) The stirring paddle is again used, but the perforated paddle suggested elsewhere, was found to accord no special benefit. Zinc skimmings recovered here are not dealt with by the patented skimmer mentioned, since partly in view of chilling resulting in a stiffer mass, a pneumatic or hydraulic form of press is used to exude the surplus lead. Although other softened leads may contain 80 oz. silver per ton and upwards, the large additions of battery scrap in the initial charges reduce this to lower proportions, but the zinging concentrates silver in the skimmings some 40-fold. Less than one-tenth of an oz. of silver remains in the lead, and this, under good working conditions, retains under half a per cent of zinc. As distinct from the normal slow steaming to remove this zinc, the Betterton chlorination system (American Smelting and Refining Co.) can reduce this zinc in an 8 hour shift to within 0.01 per cent, i.e. in the 200 ton charge.

As this process has been described elsewhere, it need not be repeated, except to remark that the finishing point is readily recognized by the kettle attendant from the kind of zinc chloride slag produced, and the form of the crystals appearing on the surface of solidified lead samples. The lead is tapped into moulds. The large blocks are dug up by a pneumatic clutch, and loaded by overhead gantry to cars on a rail-line, and run off to the storage department. The zinc skimmings, together with anthracite or coal slack are distilled in oil-fired retorts to provide 3 cwt. slabs of zinc, which are returned to the process. In place of the normal type of refractory for the retort, which has a short term of life, graphite pots are substituted, from which some 50 heats may be obtained. Retort residues still retain one or two per cent of zinc and copper, and from 12 to 15 per cent silver in the lead mass.

Cupellation Treatment

In place of the traditional cupellation furnace fired by coal, which dates back more than a century, tilting furnaces are used on the one hand, while alternatively, revolving hearths have more recently been substituted, both of which are oil-fired. The pan of the tilting arrangement, of cast-iron, was initially lined with firebrick and tamped with a limestone cement mixture, but the rotary hearth utilizes magnesite. All bottom parts of the tilting hearth are water-cooled, which provides an additional measure of control over the scorifying action as it proceeds.

The rippling effect on the litharge, by air from nozzles, at a pressure of some 18 oz., exposes fresh surfaces to oxidation, and the litharge is allowed to flow over the breast until the stage has been reached where the recovered silver is ready for tilting into a bowl, and from thence into anode moulds for electro-refining. As with other provisions for handling anode moulds, the latter are mounted on a circular table, which is moved an exact distance by a pawl arrangement, to meet requirements of the poured material.

The more recent rotary test appears to be a refinement of other rotary hearths, but the air-blast is considered to be much more effectively applied, and conditions more fully under control, than with the stationary or tilting furnace, as distinct from where work is carried out on a small scale, and where the rich lead may contain high copper contents, thereby holding-up the reaction, different consignments are arranged to suit the best ratios.

Processing Lump Manganese

Specially designed milling, screening and air separation equipment are used by the National Paint and Manganese Co., United States, to process hard-to-handle manganese dioxide, according to a report in *The American Metal Market*. The company, a subsidiary of Frank Samuel and Co., the mineral and metallurgical marketing division of Howe Sound Co., is a major supplier of ground manganese.

The Carthax screening sequence, using numerous screens strategically located at various process points, permits National to make regular shipments of manganese as fine as 94 per cent -200 mesh. Special adjustments bring as high as 97 per cent -200 mesh if required. Most common grades of granular manganese used in colouring range from the coarse 16-24 mesh granules to finer 24-40, 40-60 and 60-60 mesh. Diverse proportions can be produced at an average rate of two tons an hour, and as high as four tons per hour, depending upon screen size.

The 5 in. fragments of manganese dioxide are crushed to approximately $\frac{1}{4}$ in. sizes in a 40 h.p. rotary pulverizer which discharges via a crushed ore bin to a bucket elevator. After screening, the ten mesh or finer particles are carried directly to a 10 ft. air separator; the oversize are diverted to a ring roll mill.

The manganese particles diverted to the Sturtevant ring roll mill are fed to the anvil face of the rotating ring and are held there by centrifugal force while being crushed by the rolls as the ring revolves on a horizontal shaft. Pressures run from 20,000 to 60,000 lb. The fines escape to the bottom, forced there by the incoming feed plus the revolving, crushing action, and are returned to the vibrating screen for reclassification. At this point, the mill has ground the material to 16 to 200 mesh. The incidentally-produced 325 and finer mesh sizes are removed by a vacuum.

Crushed particles cycle again through the ten mesh vibrating screen which feeds the air separator. The separator selects 80 mesh and finer manganese particles and feeds the remainder off as tailings for further screening. The resultant extremely fine collected manganese is frequently blended with various mesh sizes made possible by the multiple screening.

The separator is a standard, 10 ft. dia., 15 h.p. centrifugal selector. The fines entering the classifier fall to the centre of a revolving distribution plate equipped with classifying vanes, which diffuse the material off the outer edge in an even, horizontal spray. An upper fan sucks up the desired fines, centrifugally knocking away any large particles that might otherwise escape with the 80 mesh or finer manganese dioxide. The heavier material is also forced away from the opening by a lower fan which whirls the upcoming material.

ELECTRICAL EQUIPMENT AT MOSCOW

Electrical equipment by two leading companies — Fuller Electric and Brush Electrical Engineering — will figure prominently on the HSI stand at the British Trade Fair in Moscow. The exhibits will include a range of specialized flameproof equipment for use in coal mines.

The Brush transformer exhibit is specially designed for operation in mines, and has passed the stringent tests imposed by the Safety in Mines Research Establishment for operation where methane is present. Of the dry type, it operates at high internal temperatures, and uses no oil for cooling or insulation. This type of transformer can be sited anywhere in the mine, so as to avoid the voltage drop which is inevitable when long connecting cables

are used. Brush will also display the stator and rotor of a non-breathing flameproof motor specifically developed for damp or dusty operating conditions or in other atmospheres for which conventional motors are unsuited, such as in the mining, quarrying and chemical industries.

A further Brush exhibit will be a flameproof battery electric truck.

GEARS FOR MINE HOISTS

Major points of engineering interest in two new sets of tower-mounted mine winding equipment currently being supplied for the Cardowan colliery of the Scottish Coal Board are the epicyclic reduction gears incorporated in the main drives. These gears, of the Allen-Stoeckicht type already in mine winding service at Monktonhall Colliery, are being supplied by W. H. Allen Sons and Co. Ltd., through Walmsley Brothers of Wigan, who are the manufacturers of the hoists, and A.E.I. Rugby, who are responsible for the main electrical equipment and also for the co-ordination of the contract. They are of a design that has become well established for many high-power industrial drives during the last ten years or so.

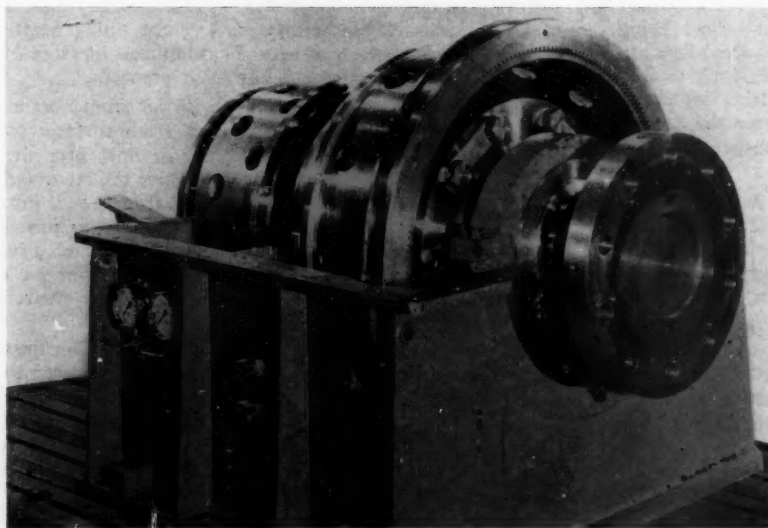
The Allen-Stoeckicht gears for Cardowan are double-reduction units, each incorporating two epicyclic gear trains. The first of these trains is of the star type, in which the planet-wheel carrier is held stationary, while the second is of the planetary type, in which the annulus system is held stationary. Reduction is from 713 to 63.1 r.p.m., and at this speed the maximum torque is equivalent to 1,320 h.p. Each gear is in fact designed to run continuously at this power.

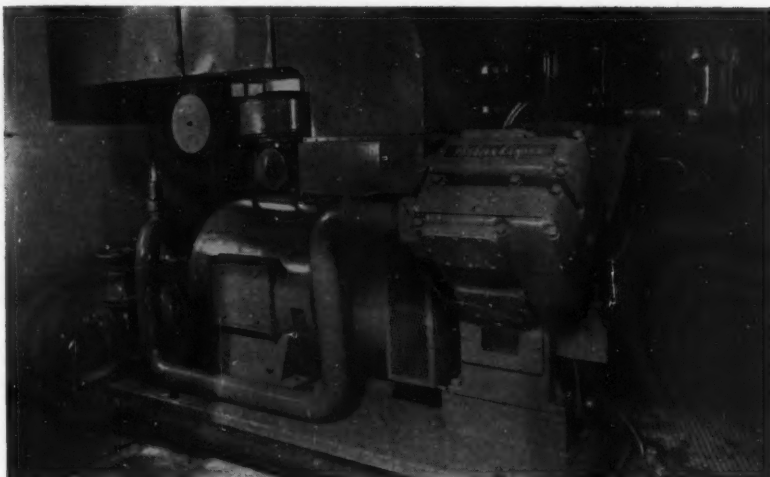
From the driving end, each gear consists first of a double-gear-toothed flexible-coupling sleeve, incorporated in the gear, taking the drive from the motor to the sunwheel of the first train. The sunwheel itself has no bearings, but is supported by the four planet wheels, and centralizes between them under the influence of the tooth reaction forces. The planet-wheels revolve on white-metal-faced spindles which are supported by a planet-wheel carrier; this is in turn rigidly bolted and dowelled to the gear-case.

The rotating annulus (outer ring) system is flexibly coupled, again by toothed couplings, to the sunwheel of the second train, in which the annulus system is flexibly coupled to the gear-case. From the floating sunwheel the drive is transmitted through five planet wheels to the rotating planet-wheel carrier. This has no main bearings, but is rigidly bolted to an output stub shaft, which is in turn bolted to the winder drum shaft. The planet wheel carrier of the second train is thus overhung from the bearings of the winder drum. The compactness of the gear can be appreciated from the fact that the first train annulus has a dia. of 22½ in., and the second a dia. of 30½ in.

Apart from the advantages of reduced weight and space, one of the special merits of epicyclic gearing for mine winding is the relatively considerable degree of misalignment that can be tolerated. A feature of tower mounted winders is that the supports are relatively flexible, and with two winders in one tower it is possible that an overwind on one will cause a deflection of the

One of two Allen-Stoeckicht double-reduction epicyclic gears for mine hoist duty at Cardowan Colliery seen from the output shaft end





Atlas Copco (Great Britain) Ltd., have a new machine on show at the Engineering, Marine, Welding and Nuclear Energy Exhibition. The new compressor is a short stroke, double acting, stationary machine known as the DT4. Its designers were set the task of planning a heavy duty machine which could be transported in narrow mine shafts and drifts and sited close to headings. It had to be compact, to operate economically, have a long working life and yet be comparatively inexpensive. To achieve these aims the DT4 was made with an unusually short piston stroke—equivalent to 21 per cent of the diameter of the low pressure cylinder. This meant that the piston speed could be kept down to 10.6 ft. per sec. (3.23 m/sec.) at 970 r.p.m. At this speed the DT4 delivers 565 c.f.m. (16m³/min.) at a normal working pressure of 100 p.s.i. (7 kg./cm²)

support of the second winder drum. The incorporation in the gears of gear toothed flexible couplings allows this deflection to be accommodated without difficulty.

TWO WEEKS AT OLYMPIA

The Engineering, Marine, Welding and Nuclear Energy Exhibition for 1961 opened yesterday at Olympia and will continue until May 4. Certain of the exhibits have application in the mining industry.

The theme of "Pumping the unpumpable" is maintained on the stand of *The Comet Pump and Engineering Co. Ltd.* where a pump operating at 0.9 r.p.m. is shown. A further unit operating at 1 r.p.m. is also on display. The company's display ranges from 14 in. units to a laboratory pump that works at 1 r.p.m.

Products of seven *Associated Electrical Industries* product divisions are shown on three stands. Amongst them, Instrumentation Division show a range of magnetic crack detectors for locating flaws in ferrous materials. The latest welding equipment from Heating and Welding Department, Transformer Division, is to be seen, the major items in operation.

Turbine-Generator Division, displays the wide range of AEI condensers and heat exchangers for the electricity supply, petroleum, chemical and other industries and a glass-fibre condenser waterbox for use where cooling water would cause graphitic corrosion of cast iron is shown. A LeBlanc rotary air-extraction pump is on the stand.

Amongst other equipments *Davey, Paxman & Co. Ltd.* are showing the 12YJCL, a 12-cylinder vee form inter-cooled pressure-charged diesel with a continuous rating for rail traction pur-

poses of 1,500 b.h.p. at 1,400 r.p.m. This is one of the most powerful and modern British designed engines of its weight and size available to-day.

Power transmission beltings for all industries is the principal theme of *Turner Brothers Asbestos Co. Ltd.*'s stand and as it will be seen, emphasis is placed on standard and premium V-Belts, flat transmission and whipcord belting. In addition, samples of rubber and PVC conveyor belts for all purposes are dis-

played, together with a range showing constructional details. These include newer types of conveyor beltings which incorporate synthetic fibres such as Terylene and nylon. The main exhibit on this stand is the POLY-V drive. Displays indicate the end applications and show how the belt matching problems associated with conventional V-Belt drives can be eliminated and emphasize the fewer cross-sections required to cover power transmission by belts.

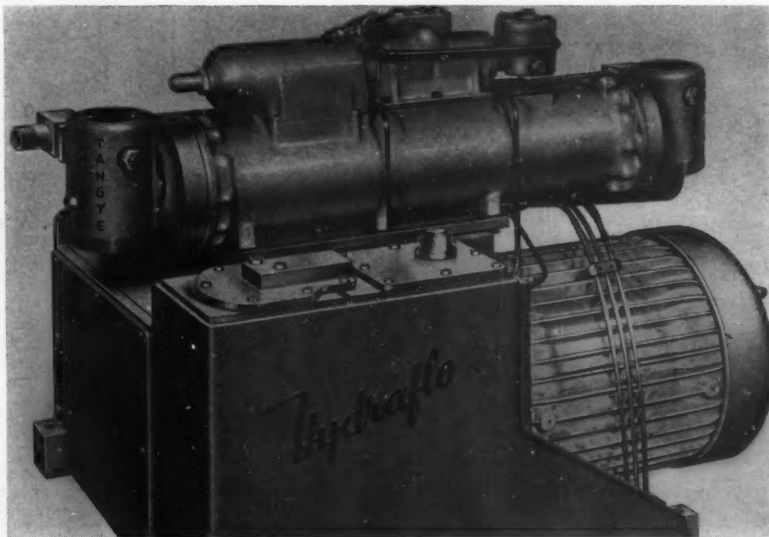
Tangyes Ltd. have made the new H type Hydraflo pump the company's principal exhibit at Olympia. The Model "H" type Hydraflo is a high pressure pump for general duties handling aqueous fluids and designed to give wide flexibility both in its range of duties and in its control. Output flexibility is achieved by providing a selection of oil-driving cylinder sizes and water-pumping cylinder sizes and a transmission drive of infinitely variable speed.

At present the Hydraflo is used in mining for deep-hole coal infusion, and it is also being investigated for high pressure jetting for de-scaling, mining.

When a number of hydraulic presses or machines are operated from one source, usually an accumulator, it is often an advantage to take power direct from a Hydraflo pump. The constant pressure control on the pump will automatically adjust the pressure requirements to suit the demand.

Goodyear Pumps Ltd. a member of the Holman Group, are exhibiting a range of pumps for marine and industrial use, as well as complete unit pumping systems with pre-wired electrical equipment, ready for immediate installation. Being shown for the first time are the B.12, which will be in quantity production by July. With a speed range from 500 to 3,000 r.p.m. it can handle a wide variety of chemical products from low to high viscosity. The Goodyear principle of pulseless axial flow characteristics are maintained. Also shown is the Goodyear fuel valve heating and cooling set.

The new "H" type Hydraflo high pressure water pump from Tangyes of Smethwick, to be introduced at the Engineering and Marine Exhibition. A unit driven by oil hydraulic pressure and providing infinitely variable speeds and quantity outputs. It is presented as a pump that adjusts itself to meet any quantity or pressure demanded, infinitely variable within its range

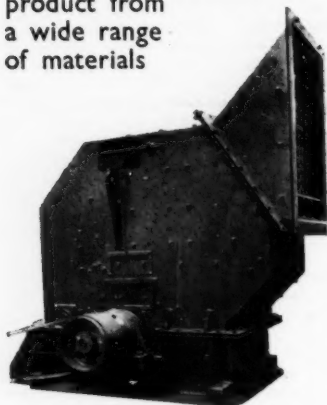


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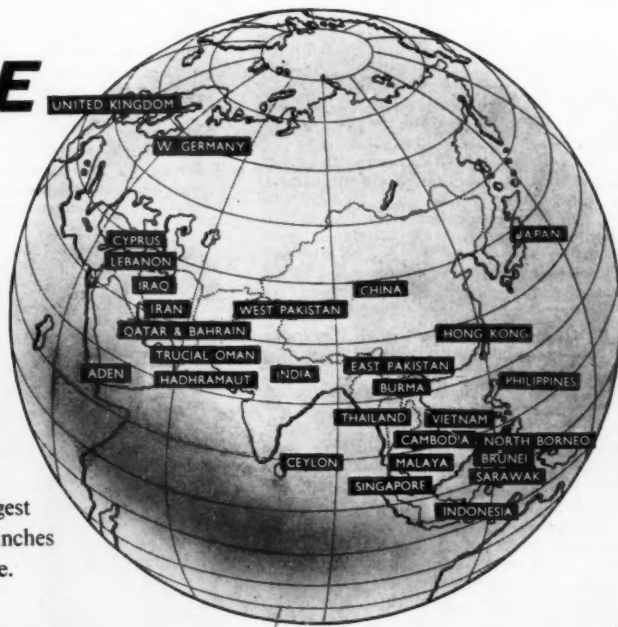
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MINING MISCELLANY

Jamaican production of bauxite for processing or shipment totalled 5,700,000 dry l.tons in 1960, compared with 5,500,000 tons in 1959. Of this output, 1,600,000 tons was used in the production of alumina, which amounted to 665,000 tons in 1960 (400,000 in 1959), the rise in production being due to the operation of Alumina Jamaica's second alumina plant. Alcoa are to mine bauxite in Jamaica through their subsidiary, Alcoa Minerals of Jamaica Inc., and have selected a site for the port and harbour installations. The two-year capital construction programme is estimated at a cost of \$U.S.15,000,000. The Harvey Aluminium Co. of America, which has been prospecting for bauxite in the St. Catherine area, has installed a sampling laboratory.

Copper deposits, stated to be important, are reported to have been found in the Aqaba district of Jordan, but their size and quality has not been disclosed. It is stated that a number of applications for exploitation have already been lodged with the government.

The Indian Government has granted permission to Sirajuddin and Co. of Calcutta to start production of ferro-silicon which will be some 5,000,000 tonnes annually. Demag of Western Germany is prepared to take up to 7,200 tonnes of ferro-silicon per year, in co-operation with an Indian firm and at an Indian plant. At present India's only producer of ferro-silicon is Mysore Iron and Steel Works, with current annual capacity of 5,000 tonnes, although expansion of capacity to 20,000 annual tonnes is planned. India's rapidly growing demand for ferro-silicon is expected to rise to some 40,000 tonnes annually by the end of the third Five-Year Plan.

A new potash processing plant, costing £4,000,000, is to be erected at Oran, in the Negev area of Israel. It will be carried on jointly by the government and a group of foreign investors, and the whole output will go to export.

Output of lead ore in Spain last year is reported to have been 104,000 tonnes, 6 per cent lower than in 1959. Export sales rose, but the sharp fall in domestic demand caused overall sales figures to drop. Coal production was 15,400,000 tonnes, slightly lower than that of the previous year. Coal imports fell during 1960 to only 220,000 tonnes, less than one-third of the 1959 imports.

Johns-Manville Corporation and the Kern County Land Co., of San Francisco plan to exploit a 1,500 acre, high-grade asbestos deposit at Coalinga, 4,000 ft. up in the Diablo Mountain range of central California. The leases and claims were acquired by the Kern County Land Co., and a new operating company, Coalinga Asbestos Co., Inc. has been formed jointly by the two firms, J-M owning the

majority interest. The new Coalinga Mine, 160 miles south-east of San Francisco and 190 miles north-west of Los Angeles, will produce ore for the new mill to be built on the site for processing.

A British mining engineer, Mr. R. C. Howard-Goldsmith, a member of the U.N. team of technical assistance experts, is to assist the Republic of Niger, to help establish a prospecting programme, and to make recommendations regarding Niger's mining and geology service. He is to work with a mining expert from Haiti, and the assignment is for two years.

Aluminium Ltd. recently announced plans to build the first aluminium rolling mill in Malaya through the formation of a company in the Federation of Malaya called Alcan Malayan Aluminium Co. Ltd. Construction of the plant, which will be located at Petaling Java, near Kuala Lumpur, is expected to start immediately at an estimated cost of over \$1,300,000. The new mill is to produce sheet, circles and building sheet and will be manned by Malayan personnel.

Jubilee Iron Corp., a subsidiary of Canadian Javelin Ltd., is believed to be negotiating with several large steel companies for the necessary funds to develop its iron ore properties in the Labrador-Quebec area. Jubilee's properties comprise some 17,720 acres in the Mount Reed - Mount Wright - Wabush Lake region of the Labrador Trough. Jubilee's president, Mr. V. B. Geffine, said recently that preliminary results of drilling last year at two of the company's proper-

ties, Star Lake and O'Keefe Lake, indicate a potential orebody in excess of 100,000,000 tons. He said mill tests have established that high-grade (64-66 per cent) iron concentrates can be produced from Jubilee's crude ore using a single low-cost gravity separation process.

Latin American Mines has received a letter of intent, presaging a contract from two Japanese companies, which are prepared to purchase up to 18,000 tonnes of copper concentrate and/or copper cement annually. Copper cement has a content of 70 per cent more copper. The signing of a contract and a projected senior financing to bring the company's Tuina property in Chile into production are contingent on a satisfactory completion of the present exploration programme and the proving up of at least 3,000,000 tons averaging 2.5 per cent copper. Canadian drillers and equipment have been sent to the property to conduct a deep drilling programme. Work to date, under the supervision of Dr. F. R. Joubin, consulting geologist, has proved 1,000,000 tons grading 2.5 per cent copper. Another 1,000,000 tons of similar grade is considered as probable below the adit workings.

One of the biggest scrap deals in East Africa in recent years has been made by George Cohen (E.A.) Ltd., who have bought all the mining gear and equipment of Mpanda Mine, owned by Uruwira Minerals, which ceased operations last July. One of the main items is the Ugalla pipeline which was laid for 42 miles but was never used. In addition to large quantities of mining machinery, there are eight large steel buildings covered with aluminium cladding. Much of the equipment has already been sold to local mining concerns, and it is understood that three of the buildings have

A good example of international industrial co-operation. This 2½ cu. yd. capacity ultra heavy-duty P&H Model 955A crawler-mounted shovel is at work in Mugga Quarry near Canberra, Australia. Designed by Harnischfeger Corp., U.S., the shovel is manufactured by Kobe Steelworks, Ltd., of Kobe, Japan, under licence from Harnischfeger International Corp. S.A. The unit is equipped with a Magnetorque swing system, which transmits power to swing the shovel electromagnetically rather than by friction clutches, reducing swing time and maintenance costs



been sold to local mining concerns and another three to the U.D.C. for their phosphate project at Sukulu.

Five West German Government experts will leave for Peru shortly to prospect for uranium on behalf of the Peruvian Government. It is reported from West Germany that the operation will probably take four to five months and Peru will provide assistants and some of the equipment. West Germany has granted D.M. 134,000 from its foreign aid funds for the search. Contrary to press reports, West Germany and Peru are represented as yet having made no agreement on the joint use of Peruvian uranium ores.

The Chilean company, Compania Explotadora de Minerales de Chile, has requested U.S. firms to make a geological survey of an area in the province of Antofagasta where, according to reports, a valuable tin deposit has been discovered. The reports added that samples show the ore to be of excellent grade, comparable to that mined in the Catavi mines in Bolivia. Meanwhile, six German technicians have arrived in Chile to carry out drillings as a preliminary to the development of a copper mine at Andacollo, in the province of Coquimbo. The deposit will be jointly operated by the Mansfeld Company of Germany and the Chilean firm Tamava SA.

It is learnt that the Karwar Port is likely to be expanded to provide addi-

tional facilities to enable it to be used for iron ore export. The Government of India, it is understood, has now taken a decision to that effect.

The High Authority of the European Coal and Steel Community announces from Luxembourg that it has made available a sum of \$U.S.330,000 for research into the flotation concentration of silicate-content iron ores. This amount will represent an estimated 65 per cent of the total needed for the scheme. The research work is being carried out jointly by the Institut des Recherches Sidérurgiques, of France, and the Studiengesellschaft für Doggererze, of Federal Germany.

According to Mr. Jatti, Mysore Chief Minister, a Rs. 80 crore aluminium plant is to be established in the Karwar district and production will begin within a year. The project will be accomplished in three stages, and reports place the State Government's share of the outlay at Rs. 1 crore. A feature of the scheme is that it involves no foreign exchange, as the sponsoring firm will import aluminium and export finished goods.

South African friends of the Hebrew University, Jerusalem, will provide funds for the new geology building. Since it was established 36 years ago, the Geology Department, inadequately housed, has been engaged in many branches of

geological studies and its activities have received international recognition. It has also contributed in a large degree to the scientific and economic development of the country, particularly through the finding of sources of underground water and minerals. The head of the Department, Professor L. Picard, has expressed the view that with the provision of suitable premises, it will be able to expand its training and research work.

According to Japanese sources, the Japanese nickel industry is negotiating for a rise in exports to Japan of New Caledonian nickel ore. Over the year ended March 31, 1961, an estimated 950,000 tonnes of nickel ore were exported by New Caledonia to Japan. For the current year, that ending March 31 next, these exports are expected to reach between 1,200,000 and 1,300,000 tonnes.

Representatives of several Japanese steel companies are currently negotiating to lease or buy two coal mines in McDowell County, West Virginia, U.S. According to a U.S. spokesman for the Yawata Iron & Steel Corp., the coal from the West Virginia mines will be exported to Japan. The same official said that if the current negotiations with the New River & Pocahontas Consolidated Coal Co. for lease and possible purchase of the Havaco and Capel mines are successful, more mine purchases may be contemplated.

GOING TO AUSTRALIA OR NEW ZEALAND?



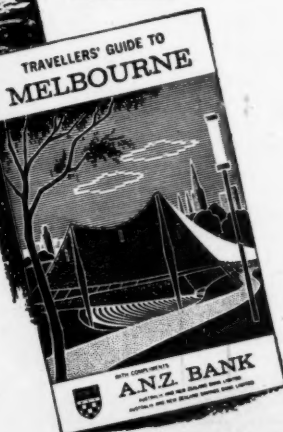
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Metals and Minerals

World Consumption of Aluminium Rises

A seven year survey of world aluminium consumption made by U.S. Business and Defence Administration shows that the volume of metal consumed by 33 countries, which take about 95 per cent of world supplies, rose from 2,900,000 s.tons in 1953 to 4,900,000 tons in 1959, a rise of about 70 per cent.

Russia has been consuming aluminium at a faster rate than that recorded for the world as a whole or for the U.S. whose total annual consumption is far greater than that of any other single country. In 1959 the U.S. consumed 2,400,000 tons, an increase of about one-half of the amount used in 1953. Russia takes second place with a total consumption of 750,000 tons in 1959, a rise of 90 per cent over the seven year period.

Other heavy users of aluminium include the U.K., France, Japan and Italy. Consumption increased by about 40 per cent in the U.K. from 261,000 tons in 1953 to 378,000 tons in 1959. France doubled her consumption from 99,000 tons to 200,000 tons and in Western Germany consumption rose proportionately from 152,000 tons to 356,000 tons.

Japan's consumption of the metal rose from 50,000 tons to 155,000 tons. In Canada, on the other hand, which is a major supplier for the world aluminium market, consumption was static over the seven years, rising only from 83,000 tons to 86,000 tons.

Bauxite

World bauxite production in 1960 has been estimated at 23,600,000 l.tons, 5 per cent more than in the previous year, according to the U.S. Bureau of Mines. The three largest producers were Jamaica with 17 per cent of world total, Surinam with 15 per cent and the U.S.S.R. which produced an estimated 15 per cent of the total. Although a decrease was reported in output from Jamaica it was more than offset by increased production in Haiti, the U.S., Surinam, U.S.S.R. and British Guiana.

U.S. imports of 8,750,000 tons of crude bauxite in 1960 established a new record and the total new supply for American domestic consumption last year was over 10,000,000 tons for the first time. Imports of Jamaican

bauxite were about the same at 4,180,000 l.tons but imports from Surinam increased for the second year in succession reaching 3,259,000 l.tons (3,071,000). The largest contributor to the increased supply was Biliton Mij Suriname NV whose shipments increased from 682,272 l.tons in 1959 to 1,109,708 l.tons in 1960. Nevertheless, Jamaica remained the chief source of bauxite imports accounting for 48 per cent of the total, while 37 per cent came from Surinam and the rest mainly from British Guiana, Dominican Republic and Haiti.

The U.S. Government has contracted to purchase 1,000,000 tons of bauxite from Jamaica for stockpiling. Reynolds Jamaica Mines, a subsidiary of Reynolds Metals is to supply 600,000 tons and Kaiser Bauxite 400,000 tons.

★

Mining of bauxite is likely to begin in the Mokanni Hills in Sierra Leone's South-Western Province early next year, states Barclays Bank D.C.O. in a report from Freetown. The Government's Geological Department has carried out extensive prospecting in that area on behalf of the Swiss Aluminium Co. of Zurich. During the course of the prospecting 250 drill holes were sunk. The mineral occurs in a narrow band over a length of about

(Continued on page 457)

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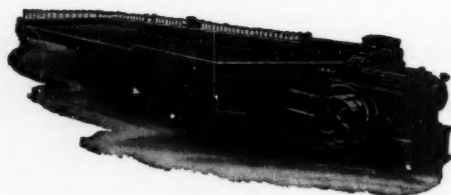
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18 miles, the thickness of the deposit varying up to a maximum of about 70 ft. and averaging about 30 ft.

*

Fairmont Aluminium Co. a subsidiary of the Cerro Corporation, has announced the successful jointing, by molecular bonding, of aluminium sheet to stainless steel. Having completed extensive field testing on hundreds of samples of the dual metal, the company is now ready to supply stainless clad aluminium. This, clearly, is a development which opens up interesting possibilities for both materials.

U.S. CADMIUM PRICE RISES

Leading U.S. producers of cadmium sticks and shapes have raised the price of the metal by 10 c. per lb. to \$1.60 per lb., effective from April 1. The increase is attributed to a long declining trend in stocks, improved demands in the plating field, a better export market, and substantial curtailment of producer materials such as flue dust containing cadmium. Contributing to cadmium's strength, no doubt, have been the restrictions in zinc production whether due to strikes or to deliberate policy.

So far, sellers of U.K. and Commonwealth cadmium have made no change in their present price of 11s. per lb., though the possibility of a rise at a future date can scarcely be ruled out.

U.K. consumption of cadmium rose last year by 10 per cent to a new peak of 1,388 tons, compared with 1,257 tons in 1959. In January this year it totalled 120.90 tons.

U.S. BARTER PROGRAMME

The Commodity Credit Corporation has announced in Washington that it could consider barter offers for antimony; amosite asbestos; bauxite (refractory and Surinam types) beryl (hand cobbled); bismuth; cadmium; celestite; chromite (metallurgical and refractory grades); corundum; mica (muscovite block and film); palladium; thorium nitrate and tin.

Crocidolite asbestos, Jamaican type bauxite, fluor spar, battery grade manganese, phlogopite mica and platinum have been removed from the list. Authorizations for them have been fully utilized.

As of December 31, 1960, strategic materials acquired through barter and held in the CCC inventory pending transfer to the stockpile were valued at \$85,900,000.

*

Materials in nine U.S. federal stockpiles were valued at \$15,994,342,000 on January 31, 1961. Inventories include 7,400,000 tons of aluminium and bauxite valued at \$498,000,000, some 42,000 tons of tungsten valued at \$341,000,000 and 4,900,000 tons of manganese and ores valued at \$340,000,000.

VERSATILITY OF NICKEL

Referring to new uses for nickel Mr. Henry S. Wingate, chairman of Inco, told shareholders at the annual general meeting on April 20 that an experimental U.S. Government airplane—the X-15—flew at 2,905 m.p.h. on March 7, the greatest speed ever attained by a (conventional) manned vehicle. The metal

skin of the airplane reached a temperature of 700 deg. F. during flight, yet retained its strength. This metal skin is made of "Inconel X" alloy, one of a series of high-strength high-temperature nickel alloys developed by Inco's research staff and produced in the company's rolling mills.

As a commentary on the versatility of nickel, said Mr. Wingate, another alloy developed by the company is for use in storing liquified gases at temperatures as low as 320 deg. below zero. This is a 9 per cent nickel steel successfully demonstrated last year. On March 16 Inco announced a new nickel steel for applications involving exceptionally high pressure and stress. Containing 18 per cent nickel as well as lesser amounts of cobalt and other elements, this new steel has a combination of properties never before realized in other compositions.

The fact that these developments occurred in the same month that the Thompson project went into production, said Mr. Wingate, symbolizes Inco's activities both as a producer of nickel and as a builder of new markets for nickel. They illustrate the interplay of those forces which, over the years, has resulted in the continual lifting to higher levels of both the demand for nickel and the world's capacity for producing nickel. (See page 463.)

AUSTRALIAN RUTILE

Signs of any reversal in the downward drift in Australian rutile shipment prices which has continued for so long seem as remote as ever. Dealers' price ideas for 95 per cent material c.i.f. now range from £24 10s. to £25 per ton, compared with £25 to £25 10s. recently. This price is said to be applicable for shipment over 1961.

It is believed that efforts are still being made in Australia for the rationalization of the industry there, such as the establishment of an export quota and a minimum export price, but they have so far proved abortive. Some of the producers, it is understood, appear unwilling to enter any rationalization plan.

QUICKSILVER PRICE DECLINES

A weak tone is still evident in the London quicksilver market. Dealers in the metal indicated the London ex-warehouse price on April 13 at £67 per flask, a reduction of £1. It was only a week ago that the price declined by a similar amount. The price is now £3 10s. below that ruling last October.

The availability of supplies from the smaller South American producers, notably Mexico, seems to be primarily responsible for the present unsettlement. Mexican material is understood to be offering at about £63 10s. per flask c.i.f. U.K., which suggests that the current £67 ex-warehouse price could still be proved rather vulnerable. Moreover, demand for marginal needs outside of those contracted for, is disappointing. However, the opinion has been expressed that should these offerings subside, the market could steady as the intake of metal under contract is considered to be satisfactory.

In the New York market sales of quicksilver are believed to have been made below \$206 per 76 lb. flask, while there have been indications that quicksilver may have been sold as low as \$204

LONDON METAL AND ORE PRICES, APRIL 20, 1961

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £230 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 0d. lb.
Cerium (99%) net, £15 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 12s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram
Gold, 250s. 9d.
Iridium, £20/£23 oz. nom.
Lanthanum (98%/99%) 15s. per gram.

Magnesium, 2s. 2½d./2s. 3d. lb.
Manganese Metal (96%/98%) £275/£285
Nickel, 99.5% (home trade) £600 per ton
Osmium, £18/£22 oz. nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £28/£28½
Quicksilver, £67 ex-warehouse
Rhodium, £43/£45 oz.
Ruthenium, £14/£16 oz. nom.
Selenium, 46s. 6d. lb.
Silver, 79½d. f. oz. spot and 80d. f.d.
Tellurium, 28s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis 27s. 0d./32s. 0d. per unit c.i.f.
Beryl (min. 10 per cent BeO) 270s./275s. per 1. ton unit BeO
Bismuth 65% 8s. 6d. lb. c.i.f.
18/20% 1s. 3d. lb. c.i.f.
Chrome Ore—
Rhodesian Metallurgical (semifriable 48%) (Ratio 3:1) £15 5s. 0d. per ton c.i.f.
" Hard Lumpy 45% (Ratio 3:1) £15 10s. 0d. per ton c.i.f.
" Refractory 40% £11 0s. 0d. per ton c.i.f.
" Smalls 44% (Ratio 3:1) £13 5s. 0d. per ton c.i.f.
Baluchistan 48% (Ratio 3:1) £11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10:1) Nb₂O₅ : Ta₂O₅ 165s./170s. 0d. per 1. ton unit c.i.f.
Fluorspar—
Acid Grade, Flotated Material £22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF₂) 156s. 0d. ex. works
Lithium Ore—
Petite min. 3½% Li₂O 50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li₂O 50s. 0d./55s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li₂O 75s./85s. per ton f.o.b. Beira
Magnesite, ground calcined £28 0s./£30 0s. d/d
Magnesite Raw (ground) £21 0s./£23 0s. d/d
Manganese Ore Indian—
Europe (46%-48%) basis 60s. 0d. freight 73d./75d. c.i.f. nom.
Manganese Ore (43%-45%) 69d./71d. c.i.f. nom.
Manganese Ore (38%-40%) nom.
Molybdenite (85%) basis 8s. 11d. per lb. (f.o.b.)
Titanium Ore—
Rutile 95/97% TiO₂ (prompt delivery) £25 10s. 0d. per ton u.i.f. Aust'n
Ilmenite 50/52% TiO₂ £11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%) 119s. 0d./123s. 0d. per unit c.i.f.
Vanadium—
Fused oxide 95% V₂O₅ 7s. 6d./8s. per lb. V₂O₅ c.i.f.
Zircon Sand (Austrian) 65-66% ZrO₂ £16 ton c.i.f.

per flask. Definite sales are known to have been made at \$205 per flask.

*

The Karabun quicksilver property in south-west Turkey, which has not been worked since the British were there before World War I, has been purchased by Utica Mines. This news appeared in our issue of April 14. A later report indicates that after some re-equipment, the new owners say that the mine's capacity should be 10 tons of liquid quicksilver a month. It is intended to have the mine in operation by June 1.

RECORD MOLYBDENUM OUTPUT AND SALES

Production of molybdenum at American Metal Climax mine at Climax, Colorado, amounted to a record 25,000 s.tons last year. This was obtained from a record 11,684,000 tons of ore, a record tonnage and 28 per cent more than in the previous year.

In 1960 sales of molybdenum, states the company's latest annual report, reached an all-time high and record foreign demand more than offset the decline in American domestic demand during the second half of the year. The report attributes the growth of foreign demand for molybdenum in recent years to its increased use in alloys and to "the vigorous growth of steel industries in Western Europe, Britain and Japan". Another factor was the increase of stocks in the pipelines between mines and consumers.

Last year good progress was made in the initial work of opening a third mining level below the Storke level; however, says the report, this new level is not expected to produce ore until the late 1960s when the Phillipson level will be nearly mined out.

Copper • Tin • Lead • Zinc

(From Our London Metal Exchange Correspondent)

In the absence of any factors of a bearish nature the past week has been a period of consolidation, with the generally favourable outlook providing a sound basis for the very steady undertone to the market. Business has been at a satisfactory level and turnovers during the week, with the previous week's figures in parentheses, were (in l.tons):

Copper	...	18,225	(12,800)
Tin	...	2,125	(1,460)
Lead	...	7,750	(5,775)
Zinc	...	6,400	(4,475)

KENNECOTT'S STOCKPILE AGAINST STRIKE RISK?

During the period under review a mild and shortlived reaction has been seen in copper prices, which foreshadowed the announcement from Kennecott that production at the company's U.S. mines and plants would be increased forthwith by working a seven-day week compared to the six-day week which has been in operation since early February. Whilst all sections of the copper producing side of the industry in the U.S. would agree that a substantial improvement in demand has been seen in recent weeks, current supplies are fully adequate and, as such, the action on the part of Ken-

So far this year it appears that the overall level of demand has remained high, including a moderate increase in American domestic requirements, but it is forecast that sales this year may fall below last year's peak.

CANADIAN TUNGSTEN CONCENTRATOR

Northwest Amax Ltd., a wholly owned subsidiary of American Metal Climax, has made financial arrangements to participate with Ventures Ltd. and Dome Mines Ltd. in assisting Canada Tungsten Mining Corporation to build a concentrator for the production of tungsten concentrates at its property in the Flat River area of the Northwest Territories.

As part of the agreement Northwest Amax will acquire a 35 per cent shareholding in Canada Tungsten. Furthermore, Canada Tungsten has entered into a sales agreement with American Metal Climax which will handle the sale of its products throughout the world.

KAISER ALUMINUM DOUBLES PURE ALUMINIUM CAPACITY

New facilities for refining super purity aluminium have been installed at Kaiser Aluminum and Chemical Corporation's Mead Washington reduction plant. They will increase by 55 per cent the company's capacity to produce the 99.99 plus pure aluminium.

Five new specially designed refining cells—the largest of their type in the industry—are already in full operation. Each cell has a rated capacity in excess of 380,000 lb. per year making Kaiser Aluminum's production capacity for the metal more than 5,300,000 lb. annually.

necott is considered rather premature. At the same time, however, in reaching this decision, they may have in mind the object of building up stocks against any halt in production which might arise as a result of strike action in the middle of the year on the failure to reach a new wage contract.

Customs smelters continue to sell copper on an average price basis rather than at a fixed price. The prospects of an early increase in their quotation have rather faded into the background, however, not only as a result of less intense Japanese buying but also in consideration of the world copper statistics. These show not only a sharp increase in stocks, but also a substantial increase in production at a time when the cutbacks in various producing centres should be showing some effect. The figures for the U.S. on the other hand, from the stock point of view are more satisfactory although, here also, production is substantially higher on the month.

Details are as follows:

	U.S.	
	March, 1961	Feb., 1961
Refined production	151,833	134,812
Shipments	111,924	93,029
Refined stocks	139,562	147,799

	World	
	1961 March	1961 Feb.,
Refined production	187,220	169,725
Shipments	208,932	192,854
Refined stocks	336,167	310,052

In Europe satisfactory demand has been reflected in the London Metal Exchange quotations which, in spite of a fall in U.K. official warehouse stocks of 401 tons to 14,967 tons, have maintained a contango. Production was halted over the weekend by a short strike at Roan Antelope over some trivial domestic problem, but work was resumed at the beginning of the week.

TIN LIKELY TO GO HIGHER

Tin prices have been rather volatile, as buyers on both sides of the Atlantic have shown some resistance at the higher levels although they are quick to take advantage of any temporary downward reaction. Provided the overall consumption is maintained or improved, on statistical grounds alone the market should resume its upward movement. There is little doubt that the buffer stock manager has been operating on a limited scale on the market.

From U.S. sources it was announced that the Office of Defence Mobilization has no plans for the release of tin from the national stockpile at present. It was pointed out that only 4,000 tons, being the balance on hand at the time the Texas smelter was sold, is available for release without the necessity of entering into the lengthy formalities which govern any release from the main stockpile.

Stocks in official warehouses last week fell 98 tons to 10,183 tons, and on Thursday the Eastern price was equivalent to £861½ per ton c.i.f. Europe.

LEAD AND ZINC UNCHANGED

There have been no fresh features during the week to disturb the overall price structure in the lead and zinc markets. Satisfactory U.K. consumer interest has been fully matched by adequate supplies of nearby metal and in both cases stocks increased last week as follows:

	Duty Free		In Bond	
Lead	8,064	(+250)	3,868	(+182)
Zinc	4,301	(+223)	775	(+425)

Lead and zinc business in the U.S. are both described as slow, and it is reported that negotiations are still continuing for the proposed barter transaction involving approximately 90,000 tons of lead from foreign countries against surplus U.S. agricultural commodities.

Closing prices were as follows:

	April 13 Buyers Sellers		April 20 Buyers Sellers	
COPPER				
Cash	£230½	£230½	£228½	£228½
Three months	£231½	£232	£229½	£230
Settlement	£230½		£228½	
LEAD				
Current ½ month	£66½	£66½	£67½	£67½
Three months	£67½	£68	£68½	£68½
TIN				
Cash	£843	£844	£842	£843
Three months	£848	£849	£850½	£851
Settlement	£844		£843	
ZINC				
Current ½ month	£84	£84½	£83½	£83½
Three months	£84	£84½	£83½	£83½

Mining Finance

Treasury's Hijacking of Overseas Tax Reliefs to End?

The failure of successive United Kingdom Governments to recognize the importance of the mining industry in gaining the initiative in the economically emergent countries is a painfully familiar record to our readers. This is continually emphasized by the archaic overseas tax legislation which fails to recognize the difference between mining and any other industry.

The Budget for 1957 went some way towards meeting B.O.M.A.'s difficulties with the introduction of O.T.C.'s, but at the time it appeared that this assistance to the mining industry was almost incidental, as it was essentially designed to assist a trading company in the accepted sense of the word. Prior to Budget day the main shortcomings, as far as the mining industry are concerned, may be summarized as (a) a U.K. mining company enjoys none of the benefits from pioneer reliefs granted by countries in which it may be operating (b) a non-resident overseas subsidiary company cannot qualify as an O.T.C. and (c) such benefits as a U.K. company does derive from O.T.C. legislation become taxable, in full, in the hands of a shareholder. How far the position is changed by the new finance bill is as yet by no means clear, but it would be churlish to suggest that the Chancellor has not gone at least some way to correct some of these anomalies.

The bill provides that double taxation agreements made with overseas governments may be amended in order that credit may be given to a U.K. resident in respect of tax that is treated by the overseas government as though it had been paid. However, it is not clear at this stage whether the proposed relief will apply to *all* income derived from overseas industries by companies or individuals, or whether the relief may be passed on to shareholders of the U.K. companies in a tax free form. There is, in fact, nothing specifically amending the O.T.C. regulation such as would enable an overseas resident company to qualify for overseas tax relief nor about allowing overseas subsidiaries to pay dividends to their parent companies completely free of tax.

The unilateral tax relief for state, municipal and provincial taxes of a similar nature to income and profits tax is only given, at present, to Commonwealth countries. It is now proposed to extend this relief to non-Commonwealth countries though, of course, the definition of taxes similar to income and profits tax still lies with the Inland Revenue Office. Those underlying taxes which, in their opinion do not fall under this definition, will still not be allowable for relief for the individual shareholder though the parent company of an overseas subsidiary will benefit.

The increase in profits tax from 12½ per cent to 15 per cent will, of course, affect all companies whether mining or not.

RIO TINTO RAISES ITS DIVIDEND

Trying to probe too deeply into the preliminary profits statement from such an extensive and complicated group as Rio Tinto can lead to mistaken conclusions without the greater detail that is afforded by the annual report itself, but one or two fairly straightforward deductions can be made from the 1960 results. There is little doubt that the rise in investment income from £2,086,000 to £3,347,000 will have sprung mainly from the higher dividends declared last year by the Rhodesian copper companies. In 1959 Tinto had 41 per cent of its assets in copper. Against this, income less expenditure is only £721,000 higher at £4,635,000 so it looks as though there may have been a considerably higher allocation on this occasion for depreciation which is charged before arriving at this figure and which took £1,997,000 in 1959. This possibility is strengthened when it is remembered that last year the earnings of Cam and Motor, the Rhodesian gold mine, will have been consolidated into the accounts for the first time, Cam having been taken over at the end of 1959.

The directors are confident enough, however, to raise the dividend by 9d. to 2s. 9d. on the 10s. stock units, a distribution which costs £1,229,000 out of a net balance of £1,957,000 after deducting the Preference dividends of £85,000. The corresponding net balance for 1959 was £1,762,000.

This does not complete the Tinto earnings picture because once again the proportion of the profits attributable to the parent company from Rio Tinto Mining of Canada and its subsidiaries is not consolidated into the Tinto accounts. The figure involved is £1,236,000 and it brings the balance from this source, not available for distribution as dividend, up to £2,594,000. It is stated that Rio of Canada's profits have been utilized for the depletion of that company's investments, mostly in Canadian uranium, a depreciation that drew a qualification from the auditors in the 1959 accounts. The cash flow of Rio of Canada should be boosted in the current year by a maiden dividend from the amalgamated uranium concern, Rio Algom. Following a deal with Mr. Hirshhorn last November Rio Tinto increased its stake in Rio of Canada from 54 per cent to over 80 per cent. In view of these two factors the profit attributable to Rio Tinto from these Canadian interests should grow considerably in the current year.

This is not likely yet awhile to enhance the parent concern's dividend prospects except insofar as the larger the cash assets overseas grow the more generous the Board in London may feel entitled to be. It is also hoped that the new double tax provisions in the U.K. Budget may make some of Tinto's earnings abroad more mobile in the sense that the tax handicap of bringing them back to London may have thereby

London Market Highlights

After the previous week's sharp and rather technical rally South African gold share prices slid back into their old despondent mood. Once again actual selling remained small but it impinged on a market almost completely lacking buyers and a disturbing feature, as far as London was concerned, was the emergence of offerings from the Cape, a centre which had previously been providing a valuable prop for the market. Unhappy though the situation was, it is worth pointing out that there seems to be no loss of faith in the earning power and prospects of the mines themselves. Pressure seems to have come mainly from forced selling because of vulnerable positions, while psychologically there is no doubt that many South Africans took a far gloomier view of the consequences of the Commonwealth Conference than that in London.

Certainly the price losses were far and away out of all proportion to the amount of stock on offer. Free State Geduld tumbled from 95s. to 88s. 9d. on Wednesday evening and "Ofsits" showed a loss on the three days of 5s. 7½d. at 62s. 6d. Loraine came back 2s. 6d. to 15s. 9d. and West Wits hit a three-year low with a fall of 5s. to 46s. 3d. In a sagging Finance group Anglo American dipped to 125s. and in the diamond section De Beers held for a while at 133s. 1½d. before succumbing to Johannesburg sales with a slide down to 126s. 3d.

The adjusted terms for the expanded "B" share rights issue of Western Deep Levels hardly impressed the market and the "A" shares wilted to 30s., the existing "B" remaining a very nominal market at around 29s.

In these dreary conditions, it was little wonder that Rhodesian coppers should also tend to droop. Price losses were generally modest, however, the heaviest being one of 2s. to 63s. in Chartered. Roan at 5s. 9d. were unworried by the two-day "African drinking water" strike. An isolated patch of brightness in the Rhodesian gold section was provided by Globe and Phoenix. This generous dividend payer again came up to very best expectations with a higher distribution and the share price greeted this with a jump of 1s. 10½d. to 35s.

After its recent steady advance the tin section ran into some profit-taking. Singapore remained a buyer, but London preferred to sell, particularly in the cases of the mines which reported lower sales in the March quarter. It was realized that the latest sales were based largely on outputs alone as they no longer have the benefit from the boost seen in the previous three months of permitted stockpile disposals. Shares such as Southern Malayan fell 3s. to 31s. 9d., Tanjong 2s. 9d. to 27s. 3d. and Pengkalen 9d. to 14s. 9d. On the other hand, the East stayed a buyer of Hongkong (26s. 6d.) from which a particularly good March quarter return was received and also of Tongkah Harbour (71s. 3d.).

The Nigerian issues which had been taking a back seat in the tin advance came to life following some Press comment coupled with the encouraging views given on investment in Nigeria by Mr. Duncan Sandys after his visit to the country. Matters were particularly helped by the sharply higher dividend and profits from Ex-Lands, the shares of which jumped 1s. 1½d. to a high for the year of 5s.

lessened. This particularly applies to the profits of the Mary Kathleen uranium company in Australia.

Factors in Tinto's earnings outlook for 1961 will be a possible diminution of income from Rhodesian coppers and the first impact of the Kern Oil deal whereby the company has acquired 3,000,000 shares in the British Petroleum company. These shares will have ranked for that concern's recently declared final dividend. The yield on Tinto units at 42s. 6d. is 6.7 per cent after allowing for the dividend still included in the price. There is some degree of political risk in Tinto because while income from its world-wide diversification programme builds up the company will remain dependent to a large extent on revenue from its Rhodesian copper investments.

This apart, there is no doubt about the growth prospects for this energetic group particularly if nuclear power based on uranium achieves the delayed, but still hoped for, major expansion in the seventies. Only a week ago Tinto announced its participation along with Imperial Chemical Industries and Rolls-Royce in a new company to operate in the field of fuels for civil nuclear engineering in collaboration with the U.K. atomic power consortia. The company is called Nuclear Developments. (See page 437.)

AMALGAMATED COLLIERIES OF SOUTH AFRICA

Amalgamated Collieries of South Africa is a member of the Anglo American Corporation group. In 1960 its Cornelia colliery produced 4,089,432 tons of coal, a record for any colliery in Southern Africa, and its subsidiary, Springfield Collieries, turned out another 2,082,832 tons. The company's consolidated net profit of £879,524 is virtually the same as that for 1959 and the dividend is maintained at 4s. 6d. per £1 share, requiring a payment of £699,750. (See page 462.)

The chairman, Mr. Tom Coulter, is chiefly worried about the continued rise in unit costs of production in the South African coal industry. The Coalbrook colliery disaster is likely to play some part in this. Although the industry has for many years past built up a record for safety that compares more than favourably, Mr. Coulter thinks, with the European and American industries, that disaster has focused greater attention on the whole question of safety in mines and it is more than likely that the South African coal companies will have to face additional expenditure in order further to improve the existing margins of safety.

Meanwhile, Amalgamated Collieries maintains a strong liquid position although it has no immediate plans for any major projects. The £1 shares are quoted in London at around 43s. 9d. to yield 10.3 per cent before allowing for double tax relief.

POINTS FROM THE KAFFIR ANNUALS

In the West Rand Consolidated report, Sir George Albu says that, under its revised uranium contract arrangements, the company expects to be the only existing primary producer of this metal in South Africa to be still in production in 1970. The reserves of uranium oxide in the Bird Reef series are still very substantial

and it is anticipated that the tonnage remaining in the mine at the end of 1970 will exceed the total which will have been produced up to that date. The company should therefore be very well placed to participate on a substantial scale in any business offering at economic prices after 1970.

Winkelhaak, the first producer in the new Kinross area gold field, reveals that at the end of 1960 its loss for taxation offset purposes was estimated at £5,350,900 so the mine should be shielded from tax payments for some time to come yet. During the current year the addition of two further filters to the plant together with certain minor accessories should raise its capacity to 105,000 tons a month, a further step on the way to the present target of 150,000 tons. Last month Winkelhaak crushed 94,000 tons for a working profit of £171,173.

St. Helena has just expended its tax loss so that during the current year liability for tax will begin to build up. In fact, during the March quarter £619,400 has had to be provided out of a profit of £1,198,721 which means that 51 per cent of earnings is already going to the government. This has reduced St. Helena's net earnings rate per annum to 4s. 10d. per 10s. share. The 1960 dividends totalled 5s. a share, but the interim for 1961 has been reduced slightly to 2s. 3.6d.

WESTERN DEEP'S NEW CAPITAL PLANS

Western Deep, the ultra-deep Far Western Rand gold mine now in the development stage, is in the unfortunate position of having to raise fresh funds at a time of great stress and strain in the South African gold share market. This has meant that the offer of 2,800,000 "B" shares which was to have been made next month to present holders of "B" shares in the ratio of one for one at 45s. is now hardly a practicable proposition with both the "A" and "B" shares languishing around the 30s. mark. The difference between the two classes of stock is that the "A" are entitled to dividends up to a total of 10s. a share before the "B" become eligible for any distribution.

So, a revised scheme is now announced. It involves the offer of 5,600,000 "B" shares to holders of both "A" and "B" shares at the reduced price of 30s. Holders of the 2,800,000 "B" shares now in issue will be offered one for every share held together with a further 1,400,000 shares in the ratio of one for every two held. Holders of the 5,600,000 "A" shares will be offered 1,400,000 "B" shares in the ratio of one for four. The nominal value of both classes of shares is £1.

Anglo American Corporation, Central Mining Finance and Consolidated Gold Fields are to underwrite the issues for a cash consideration of £294,000, but if at any time prior to April 28 there is a substantial change in market conditions the underwriters will be entitled to review this arrangement in consultation with the company. This option underlines how difficult it has become to go forward with any confidence in South African projects in present conditions. On the face of it the mining houses certainly look like being left with the bulk of the issue even at the reduced offer price unless there is a quick, and not

easily foreseeable, major revival in the Kaffir market.

The issues will raise new funds of £8,400,000 and will increase Western Deep's issued capital to £14,000,000 in 5,600,000 "A" shares and 8,400,000 "B" shares. Presumably the new money will see the mine to the production stage from the Ventersdorp Contact reef, scheduled for the latter part of next year. Initial plant capacity is to be 80,000 tons, to be expanded to 120,000 tons a month when the deep but richer Carbon Leader reef can be mined and then to an ultimate 200,000 tons. But still further funds will be needed for these later targets to be attained. Western Deep thus remains at best a long-term proposition. Further information about next month's share offers is promised this week-end.

INTERNATIONAL NICKEL MEETING

At Wednesday's meeting in Toronto of the International Nickel company of Canada the chairman, Mr. Henry S. Wingate, naturally dwelt with a good deal of justifiable pride on the bringing into production last month of the big new Thompson project in Manitoba which is expected in a matter of weeks to be turning out nickel at a rate of more than 75,000,000 lb. a year. This will make it the world's second largest producer of this metal, surpassed only by International Nickel's own Sudbury mine in Ontario. (See page 463.)

Mr. Wingate points out that the full effect on earnings of the company's enlarged capacity will probably not be felt in 1961. Although it is expected that total deliveries will be as large as the 350,000,000 lbs. for 1960, they will still include some non-profit metal (about 40,000,000 lbs.) acquired from other sources (including the U.S. stockpile) at market prices. The object of acquisitions such as these is mainly to ensure the reliability of nickel supplies, a major plank in International Nickel's marketing policy. Thompson, of course, will now play an important part in this policy. Its earnings, incidentally, will be exempt from Canadian Federal income tax for the first three years.

Inco's earnings figures for the first quarter of 1961 are not yet available, Mr. Wingate said, but the indication is that they should compare not unfavourably with the \$18,000,000, or 62 c. per common share, for the last quarter of 1960.

Financial News and Results

Killinghall Tin Repeats Dividend.—For the year to December 30 last, Killinghall Tin reports a profit after tax of £19,197 against £22,808 in the preceding year. The dividend is unchanged at 1/3d. per 5s. stock unit, leaving a carry forward of £16,996 (£19,197). The annual meeting is on May 23.

General Tin Investments' Interim.—General Tin Investments has declared a first interim dividend on the current year of 6 per cent as compared with 4 per cent in 1960. The primary purpose of this higher distribution is to reduce the disparity between the first and second dividend payments of the year.

General Mining's Results.—Preliminary results for General Mining for 1960 indicate a net income of £1,966,208

(£1,916,008). Provisions to be made from this figure include £281,629 (£189,589) for writing down investments and other assets and the placing of £588,545 (£679,924) to revenue reserves which now stand at £5,985,000. The Corporation has declared a final dividend for 1960 of 4s. which with the 3s. interim already paid leaves the total distribution for the year unchanged from 1959.

Bids for Ghana Mines.—The Ghana State Mining Corporation has received 85 per cent acceptances for A.B.A. and 87 per cent acceptances for Ariston. The offer in respect of these two companies now becomes unconditional but remains open until further notice to give remaining shareholders the opportunity of accepting. Acceptances from shareholders of Bibiani, Bremang and Ghana Main Reef exceed 90 per cent and the Corporation will exercise its right to acquire the outstanding shares compulsorily. Warning that in future all profits from these mines will be retained, the Corporation indicates its intention of pursuing an intensive mining development programme and of providing continued employment for managers and workers, whose existing pension rights will be protected.

Board Changes

Mr. J. Ivan Spens, O.B.E., has been appointed president of London Tin Corporation Ltd.

★

Mr. W. D. Wilson has been appointed a director of the General Mining and Finance Corporation Ltd.

★

Mr. D. H. Mansfield has been appointed to the Board of General Tin Investments Ltd.

Company News

Aveley Electric Ltd. have been appointed sole U.K. Agents for the Bach-Simpson range of top-quality measuring, testing and control instruments. The Bach-Simpson Co. is a completely autonomous Canadian Company, producing the Simpson Line of instruments in Canada entirely from its own resources, but sharing with the Simpson Electric Co. (Chicago) joint engineering and mutually advantageous development projects. The Bach-Simpson merchandising interests lie exclusively within Canada and the British Commonwealth.

Included in Canada's display at the 1961 Engineering Marine Welding and Nuclear Energy Exhibition is a range of test equipment manufactured by Bach-Simpson and now available to the U.K. market through Aveley Electric Ltd.

★

A team from the Paul Weir Co. Inc., U.S., consulting mining engineers, has arrived in Turkey to assist the Turkish Government in its coal mining operation at Zonguldak. The team's mission is to assist in developing the mines, mine plants, and surface and underground operations to produce and then sustain production at an initial annual level of 7,000,000 tons of raw coal. Zonguldak, 300 miles east of Istanbul, is the site of Turkey's leading source of coking coal.

THE RHODESIA BROKEN HILL DEVELOPMENT COMPANY LIMITED

(Incorporated in Northern Rhodesia)

Year's Satisfactory Result

Mr. H. F. Oppenheimer's Review

The following is from the Review by the Chairman, **Mr. H. F. Oppenheimer**, which has been circulated with the annual reports and accounts:—

We have been fortunate in being able to sell the year's output of 14,429 long tons of lead and 29,794 long tons of zinc, as the greater part of our production continued to find a ready market in the Union of South Africa and in the Federation of Rhodesia and Nyasaland. The increase in our metal stocks at the end of the year arises mainly from zinc concentrates which are being held for treatment when the new Imperial Smelting furnace comes into operation.

This satisfactory result has been achieved in spite of the unsettled conditions in the world market for lead and zinc.

In 1959, following a recommendation by the United Nations Lead and Zinc Study Group, most of the world's large producers of lead and zinc restricted their outputs. The restrictions on zinc production were, however, removed following a suggestion by the Group made in February, 1960, after the metal had reached a peak price of £96 per ton on the London Metal Exchange in the previous month. Although lead prices also stood at relatively high levels at the time, the Group recommended the continuation of restrictions on production and under this stimulus prices rose in April and May to more than £78 per ton, the highest obtained on the London Metal Exchange since 1957.

The increase in world zinc production in 1960, however, unfortunately coincided with a fall in demand and as the increase in zinc output also caused an increase in lead production, the prices for both lead and zinc declined later in the year to £62 per ton for lead and £78 per ton for zinc at the end of December, 1960. Since then, however, certain producers have restricted their output again and the prices have firmed slightly.

Construction at the mine has been largely concentrated on the new furnace and ancillary plant. It is expected that the plant will be in operation early in 1962.

Finance for New Plant

The funds required to finance the new plant are being obtained partly from the sum of £1,500,000 raised during the year by the issue of 64 per cent unsecured redeemable notes, partly from ploughed back profits, and the balance from the issue of 3,000,000 ordinary shares which the holders of the notes have the right to subscribe for in June, 1962, at a price of 10s. per share. The issue of the ordinary shares has been underwritten, and the proceeds will be used to repay drawings against the loan facilities of up to £1,500,000 made available to the Company by Anglo American Corporation of South Africa Limited.

During the year capital expenditure amounted to almost £1,000,000 which has been financed by amounts previously retained and an appropriation of £550,000 this year. This leaves the proceeds of the note issue and the £1,500,000 of loan facilities, a total of about £3,000,000, to meet the large payments to be made in the current year, for machinery, equipment and installation costs.

It is therefore gratifying that, although the price of the metals we produce has declined, we have been able to make provisions for capital expenditure at the rate originally planned and have been able to recommend that the final dividend should be maintained at 6d. which, together with the interim dividend of 3d., makes an unchanged total dividend of 9d. net per unit for the year.

The profit for the year 1960, after providing £224,000 for taxation, was £932,000 which is about £50,000 more than in 1959. Our revenue from sales of metals at almost £3,500,000 was slightly less than in 1959 and the increase in our profits after taxation arises almost entirely from the benefit derived by the Company from an amendment to the Federal Income Tax Act in terms of which capital redemption allowances for lead and zinc mines in the Federation were increased from 5 per cent to 10 per cent per annum with effect from April 1, 1959. The accelerated allowance facilitates the provision of capital, by the retention of profits, for the major increase in our operations which we are undertaking, as it reduces our liability to taxation during the period of considerable expenditure on the installation of the new plant.

Ore Reserves

During the year some 700,000 tons were added to indicated ore reserves. There was, however, a reduction of 190,000 tons in proved reserves and broken ore in stopes arising from normal mining operations. The total ore reserves are now 6,380,000 tons, an increase of about 500,000 tons as compared with the end of 1959.

The drilling programme carried out at the Company's Star Zinc property already shows that some 100,000 tons of 20 per cent zinc ore could be drawn from this source. This ore is in the form of silicate, contains no lead and is lower in grade than the ore at the Broken Hill Mine. It remains to be determined how it can most profitably be treated in conjunction with other materials available.

In association with Rhoanglo Mine Services Limited the Company is carrying out research into the production of high purity zinc which is required principally by the die-casting industry. The use of zinc in this field has increased considerably over the last few years, and this research work assumes added importance as the production of zinc will be considerably increased when the new furnace is in operation.

AMALGAMATED COLLIERIES OF SOUTH AFRICA LIMITED

(Incorporated in the Union of South Africa)

New Record Sales Output by Cornelia Colliery

The following is from the review by the Chairman, **Mr. T. Coulter**, which has been circulated with the annual report and accounts:

The gross profit on coal mining was £702,684 (£714,228). Dividends received amounted to £345,100 (£347,547) and income from trade investments, interest, rents and sundry revenue brought in £57,919 (£49,852). The total revenue was therefore £1,105,703 (£1,111,627). After the deduction of administration expenses of £44,947 (£40,528) and provision for taxation at £189,000 (£198,200), the net profit for the year was £871,756 (£872,899).

It was decided to write down the value of fixed assets to reflect the closing down of the old Schoongezicht Colliery in 1952 and the closure in the company's subsidiary, Springfield Collieries Limited, of the old colliery at Redan in 1953. As a consequence £511,343 was written back to the appropriation account from profits appropriated for capital expenditure in the past. Of this amount £252,440 was utilized to write down the book value of the old Schoongezicht Colliery assets and the balance of £258,903 in writing down the shareholding in the subsidiary company.

The amount provided for future capital expenditure was increased to £450,000 by the appropriation for a further £150,000 and £4,772 was appropriated for capital expenditure during the year. Unchanged dividends at the rate of 4s. 6d. per share absorbed £699,750 and the unappropriated profit carried forward was £424,131 (£408,253).

Current assets, excluding stores, at £1,604,570 exceeded current liabilities, including provision for taxation, by £546,027.

Directly-operated Collieries

Cornelia Colliery: The sales output in 1960 totalled 4,089,432 tons and besides being the third year in succession in which the company improved upon its previous record output this figure is a record production for any colliery in Southern Africa and is the first occasion upon which the colliery's output has exceeded 4 million tons in a year.

The gross mining profit however at £519,935 was lower than that earned in the previous year by £5,918 and reflects the increased proportion of power station trade handled by the colliery in relation to its total output. The overall increase in output was 229,042 tons of which 183,531 tons was power station trade.

The working areas served by Bertha No. 2 Shaft are now becoming excessively distant from the shaft and consideration is being given to siting a further ventilation and travelling shaft in the south eastern area of the mine to improve conditions underground.

Schoongezicht Colliery: Output from this colliery in 1960 increased by 13,176 tons to 908,002 tons.

Profit for the year, however, at £182,749 was slightly lower by £5,626

and reflects the rising trend in working costs.

Subsidiary Company

Springfield Collieries Limited: The company's sales output for the year was 2,082,832 tons, which was a decrease of 80,703 tons compared with 1959. Net profit for the year, after providing for taxation, was £228,133 which was less by £3,381 than in the preceding year.

In a normal year almost the entire output of this colliery is despatched to the Klip power station. However, in 1960, as a result of the Coalbrook disaster, only 44.49 per cent of the output of the colliery was despatched to the Klip power station. The remainder was disposed of through The Transvaal Coal Owners' Association and the greater part used in maintaining the supply of coal to Taaibos power station. This coal, although disposed of through the Association, was priced at normal Electricity Supply Commission contract rates.

Associated Companies

Blesbok Colliery Limited: In 1960 a total of 680,406 tons was sold—an increase of 46,844 tons. The net profit accruing to the company after taxation was £131,488 and dividends at the rate of 9d. per 5s. share were maintained.

New Largo Colliery Limited: Total output for the year ended June 30, 1960 was 1,356,773 tons, an increase of 123,102 tons compared with the previous financial year. Net profit after taxation was £176,463 as compared with £158,749 and dividends were maintained at the rate of 10d. per 5s. share.

Witbank Coal Holdings Limited: Net profit after taxation amounted to £22,856 as compared with £21,504 and dividends at the rate of 2s. 3d. per £1 share were maintained.

The S. African Coal Industry

The total sales output of coal in the Union of South Africa for the year was 41,961,520 tons, an improvement of 2,768,249 tons compared with the previous year. In 1959 the industry had adjusted itself to the overstocked position which developed towards the end of 1958 and it was to be expected that 1960 would show a return to normal trade patterns. However the Coalbrook disaster and a certain amount of export business introduced new factors. The inability of the Coalbrook Colliery to meet in full its commitments to the Electricity Supply Commission necessitated coal being brought in from other areas to feed the power stations concerned and this afforded a considerable additional sales outlet to certain Transvaal collieries which do not normally enjoy power station trade.

For the first time in many years The Transvaal Coal Owners' Association was successful in securing an export order for a reasonable quantity of coal to

Ceylon and it is to be hoped that a portion at least of this trade will be maintained in future.

However a disquieting feature of the industry is the continuing rise in unit costs of production which has only been offset in some instances by increases in output. Repercussions from the Coalbrook disaster have been far reaching and as a result both the Government and the coal mining industry have instituted enquiries into aspects of current mining practice, and it is more than likely that the industry will have to face additional expenditure in order further to improve the existing margins of safety.

In the case of Springfield Collieries Limited, an immediate decision was taken, some years earlier than had originally been intended, to start sinking two further ventilation and travelling shafts at the present eastern and western extremities of the underground workings.

Your company has no immediate plans for any major projects but it is clear that over the next two or three years it will be necessary, both at Cornelia Colliery and at Schoongezicht, to provide for expenditure under a number of heads, including shaft sinking and housing, which in the aggregate will make fairly heavy demands on the company's cash resources. It is proposed therefore to continue making appropriations for future capital expenditure both towards this end and to ensure that adequate financial resources will be available over the long term to enable the company to meet its responsibilities to the coal trade through its directly operated collieries and its subsidiaries.

Book Reviews

Kemp's Engineer's Year-Book, 1961. 66th Edition. Published by Morgan Brothers (Publishers) Ltd. pp. 3,000. Price (two volumes in case) 87s. 6d. (plus 2s. 6d. postage).

In the latest edition of this standard reference work the chapters on forging hammers and drop forging plant, and heating, have been rewritten, while major revisions have been made to the chapters on heat, hydraulic (mechanics of fluids) and units of measurement. New and revised British Standards have been included, while new additions to the sections on coal ploughs and conveyors, and power loading machines will be of particular interest to the mining engineer.

Year Book and Guide to Southern Africa. Published by Robert Hale, Ltd. for Union-Castle Line. pp. 750. Price 10s. 6d. (12s. 3d.)

Year Book and Guide to East Africa. Published by Robert Hale, Ltd., for Union-Castle Line. pp. 370. Price 8s. 6d. (9s. 9d.)

The 1961 edition of this Southern Africa Year Book contains 29 pages of plans and diagrams in the text, a 48-page atlas in colour by John Bartholomew & Son, a large folding road planning map of Southern Africa, a hotel and restaurant guide, and general information and statistics relating to the Union of South Africa, Angola, Basutoland, Bechuanaland, the Congo, the Federation of Rhodesia and Nyasaland, South West Africa, and Swaziland.

The 1961 edition of the guide to East Africa follows a similar pattern.

INTERNATIONAL NICKEL COMPANY OF CANADA

THOMPSON PROJECT COMMENCES PRODUCTION

WORLD-WIDE MARKET DEVELOPMENT PROGRAMMES

SIGNIFICANT EFFECTS OF NEWLY ADDED PRODUCTIVE CAPACITY

The annual meeting of The International Nickel Company of Canada, Limited was held on April 19 in Toronto.

Mr. Henry S. Wingate (the Chairman), who presided, said:

The Annual Meeting comes this year at a most auspicious time. Thompson, Manitoba, has started to produce. This is the best news I can bring to this meeting and to the many thousands of shareholders who will receive a copy of these remarks.

At the Annual Meeting four years ago we reported on the progress of our construction in northern Manitoba and said that the new project was scheduled to start nickel production in 1961. On March 25 of this year the nickel mining and refining enterprise at Thompson was formally dedicated, officially marking the first nickel production. In a matter of weeks, I expect the plant to be turning out nickel at a rate of more than 75,000,000 pounds a year.

I would like to express publicly our appreciation to these distinguished guests who participated in the dedication ceremonies:

The Honourable Duff Roblin, Premier of Manitoba.

The Honourable Paul Comtois, M.P., Minister of Mines and Technical Surveys

The Honourable Walter G. Dinsdale, M.P., Minister of Northern Affairs and Natural Resources.

The Honourable Charles H. Witney, Minister of Mines and Natural Resources, Province of Manitoba.

Mr. Robert Simpson, M.P., Member for the Churchill District.

I also acknowledge with appreciation the messages sent to us at the ceremonies by the Prime Minister of Canada; the President of the Board of Trade of the United Kingdom; the Secretary of Commerce of the United States; the Ministers of Trade and Commerce and of Veterans Affairs of Canada; the United States Ambassador to Canada; and all the many other friends from whom we heard.

As Chairman of this meeting, I also want to pay tribute to our Senior Vice-President, Ralph D. Parker, and to our Vice-President and General Manager of the Manitoba Division, James C. Parlee, for the magnificent job they have done in bringing this new enterprise into being, and to extend our congratulations to Dr. John F. Thompson, who was Chairman and Chief Officer of the Company when the project was started, and for whom it has been named.

Other Important Events

The start of nickel production at Thompson is the major event, but there are also other events of more than passing interest to the shareholder occurring since the Company's Annual Report for 1960 was released six weeks ago.

On March 7 an experimental United States Government airplane—the X-15—crossed the skies at the greatest speed ever attained by a manned vehicle,

2,905 miles per hour. The metal skin of the airplane reached a temperature of 700 degrees Fahrenheit during flight, yet retained its strength. This metal skin is made of "Inconel X" alloy, one of a series of high-strength high-temperature nickel alloys developed by our research staff and produced in our rolling mills. As a commentary of the versatility of nickel, another nickel alloy we have developed is for use in storing liquefied gases at temperatures as low as 320 degrees Fahrenheit below zero. This is a 9 per cent nickel steel which we successfully demonstrated in 1960.

Then, on March 16, the Company announced a new nickel steel for applications involving exceptionally high pressure and stress. Containing 18 per cent nickel as well as lesser amounts of cobalt and other elements, this new steel has a combination of properties never before realized in other compositions. This new material was developed in our product research laboratories and will be freely available to the steel industry.

The fact that these developments occurred in the same month that the Thompson project went into production symbolizes International Nickel's activities both as a producer of nickel and as a builder of new markets for nickel. These developments illustrate the interplay of those forces which, over the years, has resulted in the continual lifting to higher levels both of the demand for nickel and of the world's capacity for producing nickel.

It is fitting that the new project should be the subject of major attention at this meeting. This enterprise is a very valuable addition to our assets—with important meaning to the Company and its shareholders, to Canada, to one of its great Provinces, and to nickel users everywhere.

Ore Reserves and Nickel Markets

The future of our entire business rests on two pillars—our ore reserves, and the markets for nickel. The Thompson project has added substantially to our ore reserves, and will for years continue to do so. At December 30, 1960, our proven ore reserves stood at a record of 290,273,000 short tons. This included for the Thompson mine 25,000,000 short tons, with a nickel-copper content of 742,500 short tons. This addition to our ore reserves is particularly significant since our major effort in Manitoba has been on preparing for production at the earliest possible date; and we have not concentrated on proving up as ore reserves the potential of ore in the Thompson mine or elsewhere in the area. Our decision in 1956 to undertake the development was based on our outlook that the nickel ores to be found in the Thompson-Moak Lake area would sustain our operations in Manitoba for many years to come. What we have learned in the intervening years about the ore deposits supports and strengthens our original judgment.

Thompson is the second largest producer of nickel in the world. Only our own Sudbury District operations here in

Ontario are larger. Thompson increases our total nickel production capacity substantially. It provides us at the same time with multiple sources of nickel supply. It therefore plays a dual, important role in giving assurance to nickel users of the reliability of nickel supplies, which is essential to the maintenance and future growth of the demand for nickel. Moreover our new operation has come at a most useful time, for nickel production capacity in Cuba has ceased for the present to be available to the western world.

Our interest in assuring reliability of supplies was a factor in our decision to acquire and sell nickel belonging to the United States Government or its suppliers. The acquisitions, and their sale without profit at the same market prices at which we sell our own nickel, have helped to satisfy market demand and to build new markets pending the nickel production from Thompson. As a result, in 1960 we delivered a record of nearly 352,000,000 pounds of nickel, including over 51,000,000 pounds of purchased nickel. These and the similar further acquisitions continuing in 1961 lessen the United States Government's accumulations of surplus nickel and, at the same time, help us to build a strong stock position, which provides additional assurance to nickel users of the reliability of nickel supplies.

Major Market Development Programmes

The Thompson project has special meaning also to our activities abroad, particularly in the United States and Europe. Since Canada's nickel requirements represented, even before our new project came into being, only a small fraction of Canada's production, we will have to find markets elsewhere for all of the 75,000,000 pounds which Thompson newly adds to our production. We are carrying on major market development programmes in many world areas in an effort to build a demand sufficient to absorb our large exportable production. These programmes are proceeding through our rolling mill operations in the United States and the United Kingdom and through our sales and technical service officers and distributors and agents located throughout these markets and also in Germany, France, Sweden, Italy and other industrial countries of the world.

The fine relations which throughout the Company's history have been maintained between Canada and the United States have greatly facilitated and strengthened our ability to sell our nickel production. We therefore view with particular satisfaction every sign of still greater mutual understanding between the two countries. These signs include the visits between the Prime Minister of Canada and the President of the United States, the establishment and operation of official Canadian-United States committees at a high governmental level, and the newly-signed convention between the two countries on estate taxes.

The Canadian Economy

The construction and completion of Thompson also turn out to have been well timed from the viewpoint of the Canadian economy. It is creating many employment opportunities for Canadians

at this time of special need. It is also providing the basis for producing a still greater inflow of foreign exchange to assist in alleviating Canada's imbalance in international payments.

Nickel has long been a major producer of foreign exchange for Canada because the bulk of Canadian nickel production is sold in markets throughout the world. The completion of our new enterprise not only gives Canada more nickel for its export trade; it also encourages continued confidence in Canada's producers by demonstrating anew to nickel consumers that Canada is the world's most dependable source of nickel supply.

Significantly, too, we may expect Thompson to have an important effect on the Company's prospects because of the extension which it represents in the life of our Company and the additional nickel it enables us to produce on which we can realize a profit. The full effect on our earnings of our enlarged capacity will, however, probably not be felt in 1961. While the indications are that our total deliveries in 1961 will be as large as a year ago, they will still include about 40,000,000 pounds of nickel which were acquired from others at market prices and are not from our own production.

This means that we probably will not sell in the present year the full amount of our own current production. The unsold nickel production will nevertheless be available for future years. The increase in the amount of nickel which Thompson provides will, therefore, have its full—even if delayed—effect upon our earnings.

I should also remind you that under the law our earnings from the Thompson project will be exempt from Canadian Federal income tax for the first three years. This assurance of exemption was one of the important factors in our original conclusion that we were justified in undertaking this great venture.

Until 1959 the Company's sales had never been as large as 300,000,000 pounds of nickel in a single year. In

1960 our deliveries passed the 350,000,000-pound mark. For the future our organization is geared to still higher deliveries.

The Outlook

In conclusion, I would like to direct your attention again to our forward outlook as expressed in the Annual Report:

"Our assessment of the short-range outlook shows the demand on us for nickel in the first few months of 1961 at about the same average monthly rate as during the last six months of 1960, or about five to ten per cent under the rate for all of 1960. European nickel demand continues strong. The looked-for improvement in United States demand, particularly from the steel industry, has not yet come but we expect that it will during the year. For the entire year our present view therefore is that we are likely to deliver as much nickel produced from our own mines and plants as we delivered in 1960, as well as again delivering a substantial quantity of nickel, not contributing to earnings, which we will have acquired under arrangements lessening the United States Government's accumulations of surplus nickel.

"We expect our copper deliveries will not contribute as much to profits as in 1960. The prospects are encouraging for our sales of rolling mill products and platinum metals."

Our outlook for 1961 is no less encouraging than when these words were written for the Annual Report. I am also glad to be able to say that there are now some indications that the looked-for improvement in United States demand for nickel has commenced. Our earnings figures for the first quarter of 1961 are not yet available. The information we have, however, indicates that net earnings for the first quarter should compare not unfavourably with the \$18,000,000, or 62c. per common share, reported for the last quarter of 1960.

The report and accounts were adopted.

Coming Events

The Camborne School of Mines annual dinner will be held at Tonkin's Restaurant, Camborne, on May 5, 1961.

*

The Annual General Meeting of members and Associates of the Cornish Institute of Engineers will be held in the lecture theatre of the Camborne School of Mines, on Friday, April 28, at 7.15 p.m. A lecture entitled "The Modern Concept of Pneumoconiosis in Miners", will be given by Dr. T. K. Elliott, M.B., B.S., M.R.C.S., L.R.C.P., A.C.S.M., M.I.Min.E. (member). Dr. Elliott is Divisional Medical Officer, West Midland Division, National Coal Board.

*

The British Institute of Management will hold a major conference in Brighton on April 26 and 27, to consider industrial growth in developing countries. This will be followed later in the year by seminars and study groups at which some of the subjects discussed at the conference will be considered in greater depth.

Mr. S. Weinberg, chief engineer (Specialist Services) of the National Coal Board, has been invited by the American Mining Congress to address them on underground belt conveying at their annual congress which is being held at the Coal Show in Cleveland, Ohio, May 15-18.

*

The Society of Mining Engineers of AIME will commemorate the 50th anniversary of froth flotation in the U.S. with a special international programme, to be given in Denver Sept. 17-20, 1961, under the auspices of its Minerals Beneficiation Division.

*

A symposium on mechanization of mines in India has been provisionally fixed to open on November 26 next. A Mining Machinery Exhibition will be held at the same time, and U.K. firms desiring to participate should register their names with Mr. S. Bagchi, Deputy Director, Central Mining Research Station, Barwa Road, Dhanbad, India, who will provide further information.

Cornwall, extremely Rich Tin Lode—seeks individual or Company Finance, tremendous possibilities. Box No. 694, *The Mining Journal*, 15, Wilson Street, Moor-gate, London, E.C.2.

DAVIES INVESTMENTS LTD., Private Bankers (Gross assets exceed £2,500,000), are paying 7½% p.a. interest on deposits for the eighth year in succession, with extra ½% added annually on each £500 unit. Details and Audited Balance Sheet from Investment Dpt. MN., Davies Investments Ltd., Danes Inn House, 265 Strand, London, W.C.2.

UNDERGROUND MINE MANAGER

Applications are invited for the position of UNDERGROUND MANAGER at KONONGO GOLD MINES LTD., GHANA, milling approximately 7,000 t.p.m. Salary commensurate with qualifications and experience. The contract is continuous with three months' leave on full pay after each tour of 12 months. The company provides free accommodation, pays the passage outwards and homewards, and operates a Provident Fund.

Applications stating age and experience to The Secretary, Konongo Gold Mines Ltd., 49 Moorgate, London, E.C.2.

RHODESIAN SELECTION TRUST GROUP OF COMPANIES

GEOLOGIST/ GEOCHEMIST

Applications are invited from suitably qualified persons for employment in field mineral exploration in the BECHUANALAND PROTECTORATE.

Limited field experience acceptable but important that applicant should be fully conversant with wet method geochemical analytical techniques.

Commencing salary within the range of £1,300 to £1,750 per annum according to qualifications and experience. In addition, a proportionate field allowance at the rate of £15 per month and also a 5 per cent annual bonus is payable.

Leave is granted according to salary scale at the rate of four or six weeks per annum which may be accumulated up to twelve or eighteen weeks over a period of three years. Pension, life assurance and medical aid schemes are also available. Applications in the first instance to the:—

**Personnel Officer,
Rhodesian Selection Trust
Exploration Limited,
P.O. Box 1479, Salisbury,
Southern Rhodesia.**

